Evaluation of the impact of a school based health education program on caregivers' knowledge, attitude and practices of malaria, diarrhea and pneumonia in Ibadan North Local Government Area of Oyo state, Nigeria.

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Master's thesis

University Of Tampere
School of Health Sciences
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ABSTRACT

University of Tampere
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JEGEDE K.B: EVALUATION OF THE IMPACT OF A SCHOOL BASED HEALTH EDUCATION PROGRAM ON CAREGIVERS' KNOWLEDGE, ATTITUDE AND PRACTICES OF MALARIA, DIARRHEA AND PNEUMONIA IN IBADAN NORTH LOCAL GOVERNMENT AREA OF OYO STATE, NIGERIA.
Master's Thesis, 58 pages, 3 appendices
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Malaria, diarrhea and pneumonia (MDP) are the highest disease specific contributors to childhood mortality in sub Saharan Africa and southern Asia with 82% of deaths emanating from Sub-Saharan Africa and southern Asia. Preventable infectious diseases are responsible for 58% of all deaths among children aged 5 to 14 years; 8% from Malaria, 18% from diarrhoea and 10% from pneumonia. There is need to develop new models of preventive health information dissemination so as to reach out to hitherto unreached people in affected low and middle income countries (LMIC).

Government sponsored public primary schools attended by majority of the population in Nigeria provide a good platform for interacting with caregivers considered hitherto unreached by preventive health campaigns due to their socio-economic status. The frequent mandatory parents and teachers association meetings (PTA) provide a vantage for participatory preventive health information dissemination ceteris paribus.

This study aimed to evaluate the impact of a school based health education program on caregivers' preventive health knowledge, attitude and practices regarding malaria, diarrhea and pneumonia in Ibadan metropolis, Oyo state, Nigeria. The impact of awareness creation about risks of school sustained injury among primary school pupils on incidence of injury in selected schools was also evaluated.

This study was based on a developmental program tagged Improving Child Health in Public Schools (IPCIP) which was carried out in Ibadan North area of Oyo state, Nigeria. The methodology adopted was a before and after approach utilizing a case control study design. Data collected from caregivers of pupils with a validated knowledge, attitude and practices (KAP) questionnaire at baseline were compared with those collected using the same

questionnaire after preventive health education interventions on malaria, diarrhea, pneumonia and school sustained injury(for pupils) in nine study schools. They were compared to a control group of three schools with no such interventions.
Changes in caregivers' knowledge of causes and symptoms of MDP, medication compliance attitude and care seeking practices (Primary healthcare utilization) were measured and scored before and after two years of interventions at PTA meetings. Trend of school sustained injuries was also monitored in both groups with pupils in the intervention group receiving injury prevention counseling. Responses from study groups were compared using pearson chi square test and socio-demographic differences among study groups factored in using binary logistic regression analysis. Test of proportions was used to compare school sustained injuries in both groups.

The result of the study reveals that caregivers' attitude on medication compliance and healthcare seeking practices can be improved significantly by the introduction of preventive health education to Parents and Teachers Association (PTA) meetings. However, changes in the knowledge of causes and symptoms of MDP varied and were not significant except in malaria. The result also indicates that pneumonia should be emphasized as a public health emergency due to relatively low awareness and paucity of studies on it relatively to malaria and diarrhea. Counseling of pupils on injury risks drastically reduced the incidence of injury in the intervention group. Training of teachers on preventive health, injury risk reduction, first aid administration and availability of first aid kits in schools in Nigeria are recommended considering the alarming proportion of pupils that sustained injuries in the study schools. Childhood morbidity declined significantly in the group that received preventive health education intervention relatively to the control group.

Keywords: malaria, diarrhea, pneumonia, PTA meeting, medication compliance, knowledge, attitude and practices questionnaire, school injury

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Abbreviations:

GBD Global Burden of Diseases

HBM Health Belief Model

IEC Information and Education Communication

IPCIP Improving Child Health in Public primary Schools

ITN Insecticide Treated Net

KAP Knowledge, Attitude and Practices questionnaire

LMIC Low and Middle Income Countries

MDP Malaria, Diarrhea and Pneumonia

PHC Primary Healthcare Centre

1 INTRODUCTION

Malaria, diarrhea and pneumonia (MDP) are the highest disease specific contributors to childhood mortality in sub Saharan Africa and southern Asia (Friberg IK, Kinney MV, Lawn JE, Kerber KJ, Odubanjo MO, Bergh A-M, et al., 2010). They are the leading causes of death among children under five years in low and middle income countries (LMIC) with 82% of deaths emanating from Sub-Saharan Africa and southern Asia. (Institute for Health Metrics and Evaluation (IHME), 2016). Furthermore, preventable infectious diseases are responsible for 58% of all deaths among children aged 5 to 14 years; 8% from Malaria, 18% from diarrhoea and 10% from pneumonia (Morris SK, Bassani DG, Awasthi S, Kumar R, Shet A, et al., 2013). Malaria has attracted a lot of intervention and research funding relatively to diarrhoea and pneumonia despite the fact that they lead to more death in children as shown by (Morris SK, Bassani DG, Awasthi S, Kumar R, Shet A, et al., 2013), hence the unabated increase in childhood mortality figures in affected low and middle income countries.
This burden could be significantly reduced by increasing access to effective prevention and treatment interventions with greater emphasis on diarrhoea and pneumonia (G. Jones et al., 2003). There is need to develop new models of preventive health information dissemination so as to reach out to hitherto unreached people in affected low and middle income countries (LMIC). Previous reviewed evaluation studies on malarial interventions show a disproportionately low change in knowledge, attitude and practices of people despite the huge investment on preventive health over the years. Newer models need to be studied to increase efficiency and effectiveness of resources allocated to public health interventions especially regarding malaria, diarrhea and pneumonia.

Most preventive public health intervention models utilize the health belief model (HBM) which focuses on changing the knowledge, attitude and practices of the target recipients. However, this study infused community participation approach with health belief model to increase recipients' active participation in the preventive health information dissemination and assimilation process thereby resulting in a better outcome which can significantly reduce childhood morbidity and mortality from MDP on the long run in affected countries.

Nigeria is a sub Saharan African country located in West Africa. It has a current population

of about 178.5 million and a population growth rate of 2.2% (Drazen & Isard, 2004). Despite being the largest oil producer in Africa, Nigeria ranks third in the world among top five countries that have the largest number of the poor (Gabriel, 2014). Over sixty percent of Nigerians live below the international poverty line of 1 dollar per person per day (National Bureau of Statistics, 2010). In 2013, under-five mortality rate for the country was 69 per 1000 live births (Institute for Health Metrics and Evaluation (IHME), 2016; National Population Commission, 2013) but in 2015, the Institute of Health Matrix and Evaluation puts the value at an average of 23 per 1000 live births (Institute for Health Metrics and Evaluation (IHME), 2016) while 41% of children under-five years are stunted (UNICEF, n.d.-a).

Despite advances in antimicrobial treatment and development of vaccines, infectious diseases still account for over two thirds of childhood mortality in developing countries (Black, Morris, & Bryce, 2003). Most infectious diseases are preventable, but in developing countries like Nigeria, poor sanitation, illiteracy, lack of safe water supply, overcrowding and other poverty-related issues continue to add to the prevalence of infectious diseases in children (Lee, 2003).

Ibadan is the cosmopolitan capital city of Oyo state in Nigeria. It is located in the south western part of the country with a good mix of rural and urban settlements. Despite numerous well funded preventive public health campaigns, malaria, diarrheal diseases, HIV/AIDS, lower respiratory infections and malnutrition continue to cause morbidities and mortalities in Ibadan, where there are limited facilities for basic sanitation and potable water supply (Ajayi, Jegede, Falade, & Sommerfeld, 2013; Oloruntoba, Folarin, & Ayede, 2014).

Majority of children in Ibadan attend free public schools which are funded by the state. Parents and teachers in Nigeria hold mandatory meetings called Parents and teachers' association meeting (PTA) where social and developmental issues pertaining to the children and school are discussed. According to Oyo state Universal Education Board (SUBEB), Oyo state has over one million pupils in its public primary schools out of a population of about 4.5million. This implies that majority of the caregivers in the state attend PTA meetings mandated by the state. 60% of these pupils are located in Ibadan. The collective magnitude and attendance at PTA meetings makes it a viable forum for instilling preventive health knowledge, changing wrong attitudes and practices. These caregivers are majorly those unreached by public health campaigns due to their low socioeconomic status.

Hence, this study opined that by introducing health education directly to caregivers (parents) and pupils in pilot public primary schools in Ibadan through the revered PTA meetings;

(*i*) Caregivers' knowledge, attitude and preventive practices regarding malaria, diarrhea and pneumonia could be improved upon by increasing the reach (access) and opportunity to see (OTS) thereby reducing morbidity and mortality from MDP over time.

(*ii*) School sustained injuries would be reduced significantly over time.

This model of potentially effective preventive health information dissemination strategy can easily be scaled up in Nigeria and by extension, in other LMIC with similar free education policy at the primary education level.

2 REVIEW OF LITERATURE

Past epidemiological studies on malaria, diarrhoea and pneumonia focused more on under five mortality and morbidity but it is worthy of note that children between the ages of 5 and 15 years are equally exposed to the risks hence, the need to expand the reach of preventive health campaigns and interventions to specifically target caregivers of these age group who more often than not have children younger than 5. There have been many well-funded under 5 mortality reduction projects in Nigeria and Ibadan over the years with a non-commensurate reduction in childhood mortality figure making Nigeria the second largest contributor to global under 5 mortality rate with the death of 2,300 children under 5 on a daily basis (UNICEF, n.d.-a). The fact that preventable infectious diseases (malaria, diarrhea, pneumonia and HIV/AIDS) account for over 70% of the estimated one million annual under five deaths in Nigeria today (UNICEF, n.d.-b) implies that new approaches would be needed for effective preventive health information dissemination among the populace who are majorly of low education and socioeconomic status while taking into consideration that low education is not a predictor or indicator of low socioeconomic status in developing countries (Onwujekwe, Hanson, & Fox-Rushby, 2006) but may be associated with poor access to preventive health information.

In addition, all pertinent studies indicated that sufficient knowledge does not translate into good practices or attitudes in people hence the need to study how indeed attitudes and practices can be altered for the common good of improving public health and enhancing outcomes of preventive health campaigns from design to implementation.

This study explored an alternative medium of health information dissemination utilizing the health belief model which directly and selectively targets caregivers (parents) and children who are at risk of malaria, diarrhoea, pneumonia and injury. These children can be located in public primary schools in Nigeria and Oyo state by extension due to the free education policy of the federal and state government which enables children from low socioeconomic class to attend government sponsored schools thus providing a huge catchment area for directly observed, didactic and measurable preventive health information dissemination to susceptible pupils, parents and guardians. This study at baseline gave the opportunity to measure the successes of previous interventions by measuring the knowledge of participants on the causes and symptoms of the three preventable infections in childhood while benchmarking specific

attitudes and practices by parents that promote morbidity and mortality in children. Practices and attitudes such as health care utilization when a child is sick and medication compliance were assessed.

School age children between 5 and 15yrs are on average 23% of any population in Nigeria (Almar, Warren, & Schaller, 1975; Federal Ministry of Health, 1991). Majority of pupils in Ibadan attend public primary schools giving access to majority of the homes in need of preventive health information. It is mandatory for all public primary schools to convene a Parents-Teachers-Association meeting two times in a term of three months. Developmental needs of the school and payment of levies by pupils or parents are emphasized. This forum could be used as a medium for preventive health education of the parents. The PTA forum gives them a voice and a privilege to be enlightened especially regarding childhood preventive health practices that may further reduce childhood morbidity and mortality in Ibadan.

Public schools are utilized by the socially disadvantaged class hence preventive health promotion aimed at curbing childhood illnesses amongst other benefits would be well disseminated and adopted when school teachers are empowered to give health education. Teachers are revered by parents in public schools and they could serve as gatekeepers for preventive health education of caregivers (parents) which could be sustained by building health education into the teacher's training education curriculum with proper monitoring in place. Teachers' knowledge about their role in school health program in Oyo state is low with teachers in the rural areas above 40yrs and with a degree certificate and or masters showing better knowledge of their responsibilities. (Adebayo & Onadeko, 2015b). Re-invigorating these roles and equipping teachers with the prerequisite preventive health knowledge and information dissemination skill sets aimed at caregivers (parents) considering their proximity, trust and reverence by the parents are sin qua non to the long run feasibility and sustainability of this proposed health belief model based approach.

2.1 Knowledge, attitude and practices (KAP) studies on malaria, diarrhea and pneumonia (MDP).

There is paucity of studies on the KAP of caregivers on MDP in developing countries. Malaria has been given more attention while studies on diarrhea and pneumonia are lagging behind. A cross-sectional study of caregivers' KAP on childhood malaria and treatment in Urban and rural communities in Enugu, south-east Nigeria in 2004 revealed that most

respondents in the rural and urban areas are aware of malaria (99% Urban, 74% Rural; p=0.05) but they are unaware of the susceptibility of children and pregnant women to the infection. (Oguonu, Okafor, & Obu, 2005). Respondents in the study prefer self medication (Urban 79%, Rural 20%) to visiting the primary health centre (PHC). The report cited that self medicated anti-malarials are used in inappropriate dosages promoting drug resistance.
They were also familiar with preventive measures against malaria like use of insecticide treated net {ITN} (Urban 32%, Rural 56%) but usage was low (7% Urban, 2% Rural). The study concluded that knowledge of malaria was good but practices were inadequate necessitating the use of health education to change KAP. (Oguonu et al., 2005). This conclusion further shows a deficiency in past interventions at instilling change of attitude and practices of participants in the study which mirrors the general outlook of the population hence the retrogressive trend of childhood morbidity and mortality observed till date.

Furthermore, (Dawaki et al., 2016) studied malaria prevalence, risk factors and KAP assessment among rural Hausa communities in Kano state, Nigeria. They reported that 95% of respondents had good knowledge of malaria transmission, symptoms and prevention but utilization rate of insecticide treated net (ITN) was 49.5% despite its availability for free by the government. This revealed a gap between actual knowledge and practical practices that prevent the disease. Significant associations were established between respondent‘s knowledge about malaria and their age, gender, education and household income. They also concluded that significant gap exist in practices despite high level of knowledge while emphasizing that community mobilization and health education regarding the use of ITN to prevent malaria to save lives in endemic areas should be considered.

However, none of these studies gave a clue about alternative measures regarding information dissemination that the government and non-governmental organizations can adopt to bring about desired changes. This study provides such answers.

2.2 Care seeking attitude of caregivers for childhood malaria, diarrhea and pneumonia in developing countries.

A study conducted by (Bedford & Sharkey, 2014) provided a qualitative research finding on care seeking and treatment uptake for MDP among caregivers of children below five years of

age in Kenya, Nigeria and Niger with huge burden of the diseases. Identified barriers were financial barrier, distance/location of health facilities, socio-cultural barriers and health facility deterrents. Participants in the study also suggested solution ranging from community level actions, facility level and more policy oriented actions, change of social perception and practices and gender dynamics. The study concluded that significant advancement is possible if communities participate in both problem identification and resolution while been seen as partners in improving child health and survival. This conclusion is suggestive of community participation approach which this study puts to test.

In addition, (Adebayo & Asuzu, 2015) studied the utilization of a community based health facility in Idikan which is a low income urban community in Ibadan (similar to this study's area) based on the fact that health facility utilization in Nigeria is low in many communities. The result shows that the main reasons for non utilization were self medication (12.1%) and preference for general hospitals (13.8%). Moreover, respondents with higher education and socio-economic class with good knowledge and satisfaction with the facility, utilized the PHC better. Satisfaction with care received previously at the PHC is the strongest predictor of continuous use. Self medication due to unrestricted access to drugs from pharmacy and patent medicine stores are seen as deterrents to PHC utilization. Surprisingly, ways to encourage or increase utilization of primary health care centers were not recommended thereby questioning the relevance of the study.

2.3 Trend of school sustained injuries in developing countries

No study has been conducted in developing countries on injuries in schools despite the fact that it is a huge contributor to global burden of injury. Injury has overtaken diseases as the leading cause of death among primary and secondary school students in China for over two decades (Ji & Tao, 2005). Having wounds and scars is synonymous to being a pupil in Nigeria and attention has not been given to this area exposing pupils to complications like secondary infection and tetanus which led to the death of a child in the control group. Lack of first aid materials in the study schools despite this alarming trend is more worrisome. Needless to say teachers have no first aid skill set which is required but rather send pupils home in serious cases (injury and others) resulting in absenteeism and truancy affecting educational achievement and long term intellectual development of the pupils.

A study conducted in Finland by (Salminen, Kurenniemi, Råback, Markkula, & Lounamaa, 2014) show the importance of environmental factors and school playground design flaws as contributors to school injury thereby mandating wintertime master plan for every school yard in Finland involving the teachers and pupils. Their literature review was replete with references from different parts of the world but not Africa. School design flaws, bad stone riddled landscape, dilapidated infrastructure and poor sanitation are not child friendly and promote injuries as seen in the study. However, none of these studies considered the socio-psychological perspective which this study deployed by counseling pupils on injury risk, play hazards and avoidance thereby re-orientating the pupils without changing the environment which is considered impossible due to the financial implication on government in developing countries and lack of political will to do so. A health belief model based study of injury related risk behavior in primary school students in Shangai, China shows that self-efficacy (belief in one's own ability to successfully perform a behaviour) was highly related with the status of socio-psychological behavior of students (Zhang, Dalal, & Wang, 2013). This study focused on putting this conclusion to test by challenging self-efficacy in pupils to see if a decline in cases would be observed in the intervention group after preventive health counseling over a period of two years.

2.4 The Health Belief Model (HBM).

> "*HBM is a psychosocial theoretical model that predicts that individuals will take action to protect or promote health if they perceive themselves to be susceptible to a condition or problem or believe it would have potentially serious consequences if contacted and believe a course of action is available that will reduce their susceptibility or minimize the consequences or believing that the benefits of taking action outweigh the costs or barriers*." (Nutbeam, Harris, & Wise, 2010).

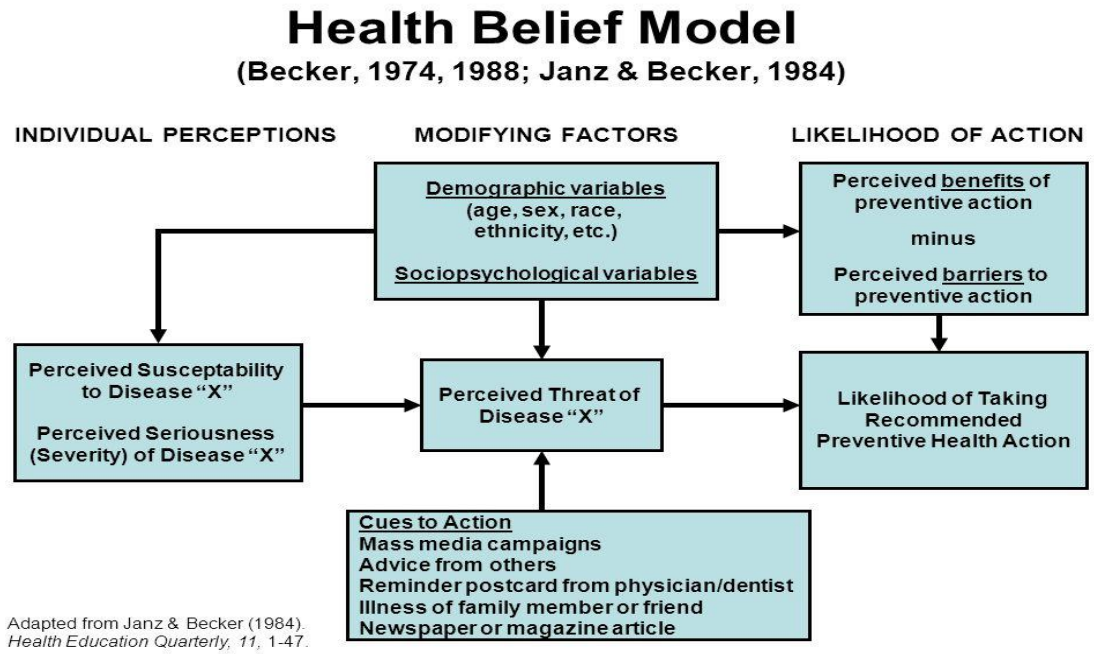


Fig.1. Health Believe Model

Five documented meta-analyses by (C. Jones, Smith, & Llewellyn, 2014), (Carpenter, 2010), (Harrison, Mullen, & Green, 1992), (Janz, Janz, Becker, & Becker, 1984) and (Zimmerman & Vernberg, 1994) have reviewed HBM's effectiveness in predicting and explaining behavior. (Carpenter, 2010) concluded that perceived barriers and perceived benefits were consistently the strongest predictors of behavior but that perceived severity was only weakly predictive. Perceived susceptibility was not found to be related to behavior in the majority of studies. Similar to earlier meta-analyses, (Carpenter, 2010) reflected on how the HBM has been used as the theoretical basis to inform the design of interventions to change behavior despite the weak evidence for this model to predict behavior which highlights the limitations of the model. (C. Jones et al., 2014) suggests that it may be behavioral change technique rather than theoretical application of the HBM that is related to intervention successes. This study challenged this hypothesis.

2.4.1 Application of health belief model to the study.

HBM interventions in the study were aimed at increasing the awareness of parents to perceived susceptibility of their children to preventable illnesses notably malaria, diarrhoea and pneumonia and the perceived seriousness and fatality of the health conditions by providing health education about prevalence, incidence, causes, symptoms, prevention and

consequences of the infections. Perceived benefits of taking action were increased while lowering the barriers by providing information about efficacy of various preventive behaviour to reduce risk of illness. The study involved identification of common barriers like alternative medicine, self-medication, wrong attitudes and practices while providing incentives and social support to engage in health promoting behaviour.

Cues to action are provided to parents by providing them with information, education and communication materials (IECs) which are stickers summarizing actions to be taken after observing symptoms of specific childhood illnesses placed in their respective homes as reminders. Self-efficacy is encouraged by training parents on the causes, symptoms and prevention of specific illnesses while creating a referral link through the teachers to the closest primary health centre (PHC) to the study area.

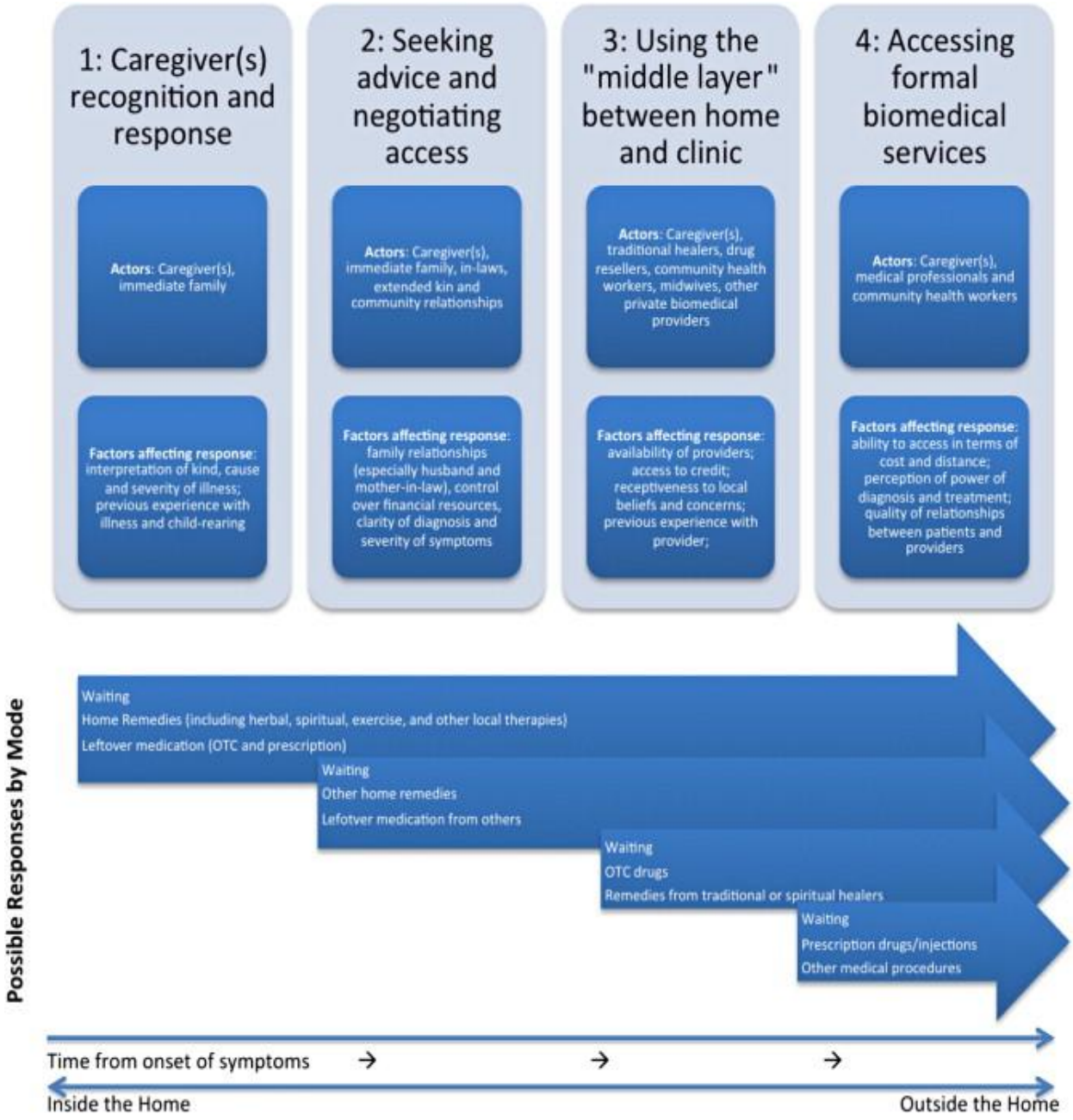
HBM approach to public health education has never been applied in the school environment in Nigeria, which is a good catchment area for the poor with low literacy level who are hitherto largely unreached by media campaigns and preventive health information. Taking advantage of the regularly well attended parents and teachers association meetings in schools and empowerment of highly respected teachers who are gatekeepers in their communities with health education skills which are disseminated to parents with the support of teaching aids may radically improve the health of children from the grass-root thereby reducing high childhood morbidity and mortality recorded in Ibadan. It is desirable that parents would perceive their children as being susceptible to the preventable health conditions with serious consequences through health education that gives them the right course of action (cues) to optimize benefits.

2.5 Care seeking behaviour for child illness in sub-Saharan Africa: The Conceptual framework.

The (Colvin et al., 2013) framework (fig 3) outlines household recognition and response to diseases such as diarrhea, pneumonia, and malaria in sub-Saharan Africa that influences the nature of treatment decisions made by caregivers. Caregiver decision making in response to child illness within households is critical to reducing child morbidity and mortality in sub-Saharan Africa. (Pierce, Gibby, & Forste, 2016). The framework shows four modes of response starting with recognition of disease symptoms inside the home before seeking for treatment outside the home. Caregivers' understanding of the causes of illness has an

influence on the type of treatment they will pursue. In Nigeria like most of other sub-Sahara African countries, supernatural causes e.g. witchcraft is sometimes considered necessitating both physical and spiritual care seeking. When cases get worse, or do not improve, caregivers make hospitals a last resort, which is often too late. (Pilkington, Mayombo, Aubouy, & Deloron, 2004) Response to illness is associated to education, media exposure and healthcare knowledge. Exposure to media is an important mechanism for disseminating healthcare knowledge and education as shown by (Westoff & Koffman, 2011) whose work showed that daily exposure to radio and television increased modern contraceptive adoption and use in sub-Saharan Africa.

In Nigeria, like in many other African cultures, the men take financial and healthcare decisions (Falade et al., 2006) which often delay response as mothers have to seek permission and finances from their husband before leaving home to seek outside care like hospital, pharmacy or traditional healers at the risk of child survival and well-being. (Abuya, Ciera, & Kimani-Murage, 2012; Vikram, Vanneman, & Desai, 2012) Based on this framework, the study examines the kind of treatment option explored by caregivers in the study cluster schools following the recognition of child illness in the intervention group vis a vis the control group. Options available to caregivers include going to healthcare facility (PHC), going to the pharmacy, visiting a traditional healer, pursuing other self-treatment options (herbs, prayer etc.) or visiting traditional birth attendants, propriety patent medicine vendors, chemist, religious healers or a neighborhood nurse. The intervention was aimed at influencing these decision-making processes in favor of early recognition of symptoms and seeking for the right formal biomedical service, which is available at PHCs.



Source - Social Science & Medicine 86 (2013) 66e78

Fig 2. C.J. Colvin model

2.6 Recognition of causes and symptoms of malaria, diarrhea and pneumonia (MDP) in developing countries.

Morbidity and mortality from MDP can be reduced significantly if care is sought early. This would depend on the ability of caregivers to identify their causes and symptoms. Caregivers should be conversant with fever and pallor characteristic of malaria, frequent loose stools and

dehydration peculiar to diarrhea and rapid breathing with chest in-drawing typical of pneumonia (Geldsetzer et al., 2014).

A systematic review of previous studies by (Geldsetzer et al., 2014) shows that caregiver's sensitivity for recognition of MDP is low. Median sensitivity for malaria was 37.4%, Diarrhea 26% and Pneumonia 28.9%. Knowledge of causes and symptoms of MDP would aid the inculcation of proactive preventive practices by caregivers.

This study tested the effectiveness of introducing health education to caregivers (parents) in public primary schools through the PTA (Parents and Teachers Association) meetings, which is an existing reputable and revered channel of communication between the schools and caregivers. The objective is to influence caregiver's preventive health and care seeking attitudes and practices. Studying Knowledge, attitude and practices is complex as they are also influenced by other external factors such as cultural beliefs, illness perceptions, perceived illness severity, efficacy and cost of treatment, household income, rural location and gender. (Colvin et al., 2013).

2.7 School Health Policy (SHP) in Nigeria.

The Federal ministry of Health in Nigeria works in collaboration with the State Universal Education Board (SUBEB) to implement the government's policy on school health. This program entails school health services, school health education, school meal services, regular mass de-worming in schools, school, home and community relationship (Federal Ministry of Education, 2006). The policy is aimed at understanding and improving the health of the school population.(Akani, Nkanginieme, & Oruamabo, 2001). The policy if well implemented should; enhance personal hygiene in pupils, cub the spread of communicable diseases, ensure early detection of illness, provide first aid in schools, promote health consciousness in pupils, parents and teachers and by extension, the community. (Adebiyi, 2001; Ademuwagun & Oduntan, 1986; Okeahialam, 2003). Access to hygienically prepared, nutritious and monitored meals in school premises served by certified food vendors is very important to avoid oro-feacal transmission of food and water borne infections like typhoid, cholera and intestinal helminthes in school children. (Idowu & Rowland, 2006). Regular de-worming of pupils with cost effective WHO certified drugs for mass de-worming with broad spectrum like mebendazole and albendazole every six months (as recommended by WHO),

would also ensure optimization of nutrients for proper brain and body development while worms that usurp nutrients in children are kept in check. (Alum, Rubino, & Ijaz, 2010; Hall, Horton, & de Silva, 2009).

However, the school health policy in Nigeria has been poorly implemented. Teachers in a study in Oyo state have been found to have a low perception of their roles in its implementation due to poor health information knowledge and training (Adebayo & Onadeko, 2015b). Oyo state has only one officer saddled with the responsibility of monitoring its implementation in the state. Anecdotal reports show a lack of first aid facilities in schools, paucity of health education of pupils and parents, nor regular de-worming of pupils by local governments. The policy was designed to nurture good health of children between the age of 3 and 15 years with a view to guaranteeing a better and healthier future for them with the support of the teachers, home, community and government (Moronkola, 2003).

This study hopes to incorporate these activities by training teachers in pilot schools to give health education to caregivers of pupils with the aim of initiating school, home and community relationship with a resultant measurable change in knowledge, attitude and practices of caregivers over time in the study group when compared with the control group pre and post intervention.

2.8 The knowledge, attitude and practices (KAP) questionnaire

> *'KAP questionnaire is a cross sectional survey tool that helps researchers to understand the economic and socio-cultural context within which public health programs are implemented by the international aid community aimed at improving the health of poor people across the world. It is commonly used due to inherent advantages such as convenience of training enumerators, easy design, ease of interpretation and concise presentation of results, quantifiable data, generalizability of small sample results to a wider population, cross-cultural comparability and speed of implementation'*.(Launiala & Kulmala, 2006).

Knowledge, attitude and practices (KAP) questionnaire was used for the study. It is a validated tool used in surveys and data collection in childhood health which was adapted by the department of Child health of the faculty of public health of the University of Ibadan, Nigeria (Appendix 1). It comprises of two questionnaires targeting the caregivers (parents)

and the teachers. However, this evaluation is based on the caregivers' questionnaire. Its components are the socio-demographic data, preventive practices, attitude, care-seeking behaviour and practices.

3 AIM OF THE STUDY

The overall aim of this study is to evaluate the impact of introducing school health education on caregivers' knowledge, attitude and practices with regards to malaria, diarrhea and pneumonia (MDP); and school sustained injury by pupils in public primary schools in Ibadan, Oyo state, Nigeria.

3.1 Research questions

The research questions that the study aimed to answer were:

Would health education provided to caregivers at parents and teachers association meetings (PTA) and counseling of pupils during school sessions:

a. Improve caregiver's **knowledge** about **causes and symptoms of** Malaria, Diarrhea and Pneumonia?

b. Improve caregiver's **attitude** towards compliance with medication prescribed to their children when ill?

c. Improve caregiver's health seeking **practices** for their children?

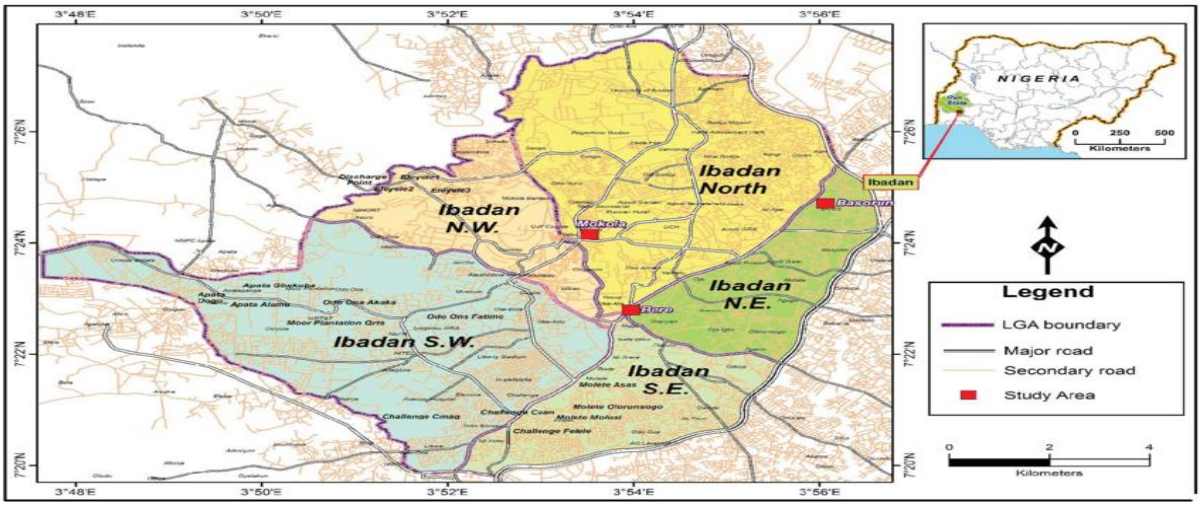
d. Reduce the proportion of injuries children sustain during school hours?

4 MATERIALS/SUBJECTS AND METHODS

4.1 Description of study area- Ibadan, Oyo state.

Ibadan is the capital of Oyo state. It is located in the south-western part of Nigeria with over 2,550,595 Yoruba speaking inhabitants according to the 2006 census (Nigerian Population Commission, 2006). It has 3,080 square kilometre of land mass area that is the largest among cities in Nigeria. It situated within the tropical rain forest zone making it a conducive environment for malaria and pneumonia causing agents.

The general state of development in Ibadan is poor with little infrastructure for water and basic sanitation in about half of the city predisposing children to diarrhoea, typhoid fever and other water and hygiene borne diseases. (State Economic Empowerment and Development Strategy (S.E.E.D.S), 2004). About 30% of her inhabitants use improved sanitation facilities (African Development Bank Group, 2014). Educational status of Oyo state where Ibadan is located is low (UNESCO, 2012). The total population of Oyo state is 5,580,894 with about 1:1 male to female ratio of 2,802,432 :2,778,462 and an annual growth rate of 3.5% . Adults are mainly traders, engaging in artisan trades. There are eleven local government areas (LGA) in Ibadan. The study was carried out in Ibadan North LGA. Ibadan North is surrounded by Ido, Ibadan North West, Lagelu, Egbeda, Ibadan East and Akinyele LGAs.



Source:https://www.researchgate.net/figure/303697456_fig2_Figure-3-Map-of-Ibadan-metropolis-201

Fig 3: Map of Ibadan

4.2 Data sampling, research design and sample size

A case control study design was used. Selected primary schools were divided into two groups: one group was provided with health education (intervention group) and the other group served as a control group in order to evaluate the impact of the health education program on the knowledge, attitude and practices of caregivers and pupils. The health education program was carried out over a period of two years. Sick bays were set up in both intervention and control school clusters to document cases or trend of illnesses in the study groups.

The study population comprised of all caregivers (parents) of pupils in selected public primary schools in an urban local government area of Ibadan in Oyo state. All caregivers with children in kindergarten to primary four who gave their consent to participate and attended over 50% of the health education intervention in the study group (during PTA meetings) were included. All consenting caregivers in the control group without health education intervention, with children in primary four and below were included in the study. Caregivers of pupils in primary five and six were excluded to avoid loss of to follow up from caregivers of pupils that would have graduated into secondary school before the end of the study.

A before and after approach was adopted with the use of a standardized and validated KAP questionnaire at baseline and post intervention (after 2years) which were analysed. Trained interviewers who were nurses administered the questionnaire to caregivers who reported at the sick bay for this purpose voluntarily in both the study and control group. This implies that caregivers were not followed up (it was not a follow up study) after the intervention but randomly selected from the eligible population of caregivers that were present during the intervention.

Two stage cluster sampling technique was used in selecting participating primary schools. Firstly, a ballot was drawn among the five local government areas in Ibadan. Ibadan North was selected. Secondly, a convenience sampling technique was utilized to select participating schools within the local government. All public primary schools with 3km radius of the University of Ibadan were eligible to be among the cluster study group while all public primary schools within 3km radius of the University college hospital were eligible to be in the control cluster group. The choice of reference was due to the fact that the study was coordinated from both institutions hence proximity to study sites took preference.

A minimum sample size of 525 caregivers was obtained considering a cluster effect of 1.5

using size formula for comparing two proportions. Four clusters of schools comprising of 2-3 schools each were selected into the study group while one cluster of 3 schools served as the control cluster group to yield a minimum of caregivers that will yield the sample size required. The total number of pupils in the selected schools were 3,495 pupils, and 330 teachers.

Response rate of 76.95% was obtained at the baseline with 404 participants while it was lower at the post intervention at 61.3% with 322 voluntary participants. At baseline, 286 caregivers from the intervention group participated and responded to the KAP questionnaire while 118 caregivers participated in the control group. Post intervention, 231 participants were recorded in the intervention group while 91 participated in the control group.

4.3 Description of project schools

The total number of participants in the selected schools were 3,495 pupils and 330 teachers. The total number of health workers were ten, while the caregivers (parents) of these pupils were 6000 in all. The study cluster schools were: Abadina primary school, U.I.; Emmanuel primary school, Samonda; St. Thomas primary school, Agbowo and Olives' primary school, Bodija market. IMG/CAC primary school served as a control cluster group for analyzing the outcomes of the intervention activities.

Inclusion criteria- All caregivers (parents) of pupils in the first 4 years of study were involved in the study to allow for follow up. Caregivers within this group must have attended over 50% of PTA meetings. Participants must be adults above 18years.

Exclusion criteria- Caregivers of pupils in the two last classes (Primary 5 and 6) were excluded to avoid loss to follow up. Caregivers that attended less than 50% of health education intervention were excluded from the study. Teachers were excluded from the analysis.

Approval for the study was obtained from the Ministry of health, Oyo state (Appendix 2)

4.4 Data collection

4.4.1 Collection of Baseline data and development of materials for intervention phase.

In the baseline data collection phase, a structured validated KAP questionnaire with close ended questions was used by trained interviewers who are nurses to collect data about the

knowledge, attitudes and practices of caregivers regarding child health issues including knowledge about malaria, diarrhoea and pneumonia (MDP) and their prevention. The questionnaire covered socio-demographic characteristics of caregivers and their knowledge, attitude and practices on child health with particular emphasis on malaria, diarrhoea and pneumonia.

The questionnaire was pre-tested and modified before the commencement of the needs assessment. It was translated into Yoruba and then back-translated to English to ensure the retention of the meaning of the questions asked. The Yoruba version was applied on the field.

After the interviews were completed, the data obtained was entered, cleaned and analysed using IBM SPSS 23. Information was extracted from the data regarding specific areas in need of intervention. Content of the training programs to be carried out in the intervention phase were designed based on the needs identified. A facilitatory approach was used to proffer solutions to the problems identified. Training modules were developed by the study team with inputs from the ministries of health and that of education via provision of resource persons.

From inception of the study, nurses were employed, trained and stationed at each of the primary school cluster selected for the study. During the needs assessment phase, the nurses provided routine health check-ups on pupils and continually collected data for the actual intervention phase.

4.4.2 Educational intervention and first aid (2013 – 2014)

The results of the baseline survey formed the basis of the educational intervention package using lectures, seminars, films, group discussions and I.E.C (Information, educational and communication) materials to enlighten parents and teachers on child health issues in the study cluster group.

Functioning sick bays were established in all the selected school clusters to provide first aid to pupils. A nurse was assigned to each school cluster who provided nursing care and first aid to all school children selected for the project. During the period of the study, a doctor was assigned to each school cluster to provide oversight function. Referral linkages were established from school health care givers to selected primary and secondary health care facilities. The selected schools were provided with first aid boxes, medical equipment (including otoscopes, stethoscopes, weighing scales) and various pharmaceuticals. Data of cases presenting in the sick bays were provided from the report of daily activities of the

nurses, which was analyzed on a termly basis.

4.4.3 Peer educator training and awareness raising at primary schools

A 5-day interactive training workshop was organized for peer educators. 3-4 peer educator volunteers were selected among teachers from each study school cluster. If in any school more than one teacher is interested to volunteer as a peer educator, the person was chosen by ballot. The peer educators received a training module designed by professional peer education trainers with a package for recording their activities during the intervention phase. The programme included sessions on malaria, diarrhoea and pneumonia and their prevention. Peer educators educated everyone present at the mandatory Parent Teachers Association meetings in study groups only.

Nurses assigned to the intervention schools provided counselling to the pupils on various measures to reduce school acquired injury, increase personal hygiene and increase preventive health culture. Activities of food vendors were scrutinized in the intervention schools to ensure appropriate food preparation and dispensing to the pupils. The use of nylon materials to dispense food was abolished for hygiene reasons by the provision of individualized covered feeding bowls and cutlery to each child in the intervention schools. These interventions aimed at the pupils were not carried out in the control cluster.

4.4.4 Health education seminars in parents-teachers association meetings.

Representatives of the study team worked in collaboration with peer educator in each of the test primary schools to give extensive health education to parents and teachers during their regular mandatory parents-teachers association meetings. The content of the programme was similar to that organized for peer educators (in a compressed form) and included interactive components, film shows, play-lets etc. In addition, the participants were encouraged to ask questions freely, either in oral or written form to initiate discussions.

4.4.5 Post-intervention KAP study.

The same validated questionnaire applied at the baseline was administered to participating caregivers after two years immediately after all health education intervention to parents who volunteered within the intervention and control groups. No intervention took place in the control group. Data generated are entered, cleaned and analyzed using IBM SPSS 23

statistical analysis software package.

4.5 Evaluation of research questions

Evaluation and monitoring data were produced by the baseline KAP study, continuous monitoring data collected by nurses assigned to the selected pilot school clusters and the post intervention KAP study.

The evaluation assessed changes in the KAP of caregivers to preventive health knowledge between the study and control cluster schools. Trend of illnesses presenting at the sick bays were also documented throughout the life cycle of the project. Extracts of incident cases seen at the sick bays in the schools during four different terms during the intervention were documented. Eight health education interventions were carried out in the study group over a period of two years while there was no intervention in the control cluster.

4.6 Measurement of variables

4.6.1 Socio-demographic variables

In this study, the socio-demographic variables include marital status of parent, highest education of mother, highest education of father, occupation of mother, occupation of father and number of children being raised by the caregiver. Some of the variables such as parent's marital status, mother and father's education and occupation were categorized for this analysis.

Marital status was categorized into two groups: Married and not married as majority were married necessitating the combination of respondents within the single, co-habiting, separated, divorced or widowed groups. The highest educational attainment of mother and father is also categorized into two groups: Low education and higher education. Respondents with primary, quaranic or no education are grouped as low education while those with secondary, tertiary or higher degrees are grouped as having higher education. Furthermore, all other categories of occupation of caregivers other than trader (unemployed, farmer, civil servant and artisan) were classified as others (Non traders). Number of children was left uncategorized (continuous variable).

4.6.2 Outcome variables

Six variables were used to describe the knowledge of respondents about malaria, diarrhoea and pneumonia (MDP). Score was allocated to their knowledge of causes and symptoms of MDP based on positive responses to questions on pertinent issues on MDP, which are expected to be common knowledge. These produced three variables each for knowledge of causes of MDP and another three variables for knowledge of symptoms of MDP.

Two more variables were used to describe the attitude and practices of respondents (Table 1).

Table 1. Outcome variables coding for statistical analysis

Variable	Questions	Coding
Knowledge score on causes of malaria	Malaria can be contacted by 1. Sharing dishes 2. Walking in the hot sun 3. Lack of immunization 4. Mosquito bites 5. Stress.	The responses were categorized into Yes(1) for right responses while the wrong responses and don't know options were combined to No(0). These give a sum of five possible responses for each respondent. A new category of knowledge score is created by summing up the score for each respondent on a scale of 1-5. A score between 0-2 is recoded as Low-No knowledge while a score between 3-5 is recoded as Average-Excellent knowledge, giving two viable re-categories.
Knowledge score on causes of Diarrhoea	Diarrhoea can be contacted by 1. Teething 2. Using dirty hands to handle food 3. Touching items in public places 4. Hot weather 5. It happens even with clean environment	Same coding procedure as for malaria above Diarrhoea is caused by specific bacteria and viruses that are contacted when dirty hands are used to handle food or by poor hand washing practice after touching items in public places like toilets, door knobs or handles which may have the causative organisms on them.
Knowledge score on causes of Pneumonia	Pneumonia can be contacted by 1. Not covering food 2. Exposure to the air when a person with the disease coughs or sneezes 3. Lack of immunization 4. Not washing hands after using the toilet 5. Exposure to cold flooring	Same coding as above Pneumonia is caused by specific bacteria, which is infectious and thrives well in cold temperature. Vaccination against the causative organism prevents the infection.
Knowledge score on symptoms of Malaria	What are the symptoms of Malaria? Red eyes, fever, vomiting, diarrhoea, body and joint ache, weight loss, loss of appetite and convulsion.	The right options are marked yes/right (1) or No/wrong (0) after recoding of the wrong options as (0). A tally of the score is made. A 50% quartile or its approximate was chosen as a cut-off point to create the new variable Knowledge score on symptoms of Malaria. Respondents with a score of 0-4 are categorized as having Low-No Knowledge of symptoms of Malaria while score of 5-8 are categorized as having Average –Excellent Knowledge of symptoms of Malaria.
Knowledge score on symptoms of Diarrhoea	Identify symptoms of Diarrhoea- 1. Colicky abdominal pain 2. Ongoing fatigue 3. Restlessness 4. Vomiting 5. Sunken eyes 6. Watery stool.	Same coding as above Respondents with a score of 0-3 are categorized as having Low-No Knowledge of symptoms of Malaria while score of 4-6 are categorized as having Average –Excellent Knowledge of symptoms of diarrhoea.

Knowledge score on symptoms of Pneumonia	Identify symptoms of pneumonia 1. Cough 2. Vomiting 3. Weight loss 4. Difficulty in breathing 5. Difficulty in eating and talking 6. Blue mouth and tongue 7. Coma 8. Drowsiness 9. Headache.	Same coding as above Respondents with a score of 0-5 are categorized as having Low-No Knowledge of symptoms of Pneumonia while score of 6-9 are categorized as having Average –Excellent Knowledge of symptoms of Pneumonia.
Caregivers Care seeking Attitude.	If your child is given a medication by a doctor, when would you stop giving the medication? The options are: (1) When child completes the recommended dose (2) When child gets better (3) Anytime I feel like (4) Others.	The first option (coded right) implies that the actual dosage and drug use duration advice are strictly complied with (good drug compliance). This is important for therapeutic efficacy, prevention of relapse and reduction of drug resistance development by causative pathogens, which is a challenge to biomedical practice. Other options were re-coded into wrong (0)
Caregivers Care seeking Practices.	With whom or where will you seek care first if your child is sick with Malaria, Diarrhea or Pneumonia? 1. Go to health facility 2. Go to pharmacy 3. Go to traditional healer 4. Pursue other self-treatment options 5. Traditional birth attendants 6. Propriety patent medicine vendors, chemist 7. Religious healers 8. Nurse who is your neighbor.	Use of health care facility is the ideal choice hence coded right (1). Other options are recoded into wrong (0). The study is interested in observing changes in primary health centre (PHC) utilization by participants in the study

4.6.3 Trend and proportion of illnesses presenting at the sick bays.

Common childhood illnesses presented to the nurses at the sick bays in all study schools were captured using a daily, monthly and termly reporting tool. The proportion of the different presentations were classified into four groups namely; a. School sustained injury b. Diarrhea, vomiting and stomachache c. Headache, flu, fever and body pain c. Others (infections, fainting measles, fracture, epistasis, burns, convulsion, tonsillitis, sprain, visual defect, skin infection). Stata 14 statistic/data analysis software was used to compare the proportions pre and post intervention. Graphs are used to visualize the changes in trend using proportions between the intervention and control schools.

4.7 Statistical Analysis

The data from the baseline and post intervention KAP questionnaire were analyzed with SPSS version 23. A syntax code was written to extract inputs from caregivers out of the data

as teachers were excluded from this study. Cross-tabulations of data generated between intervention and control schools were made to see the association between them, pre and post intervention using Pearson Chi square test. Variables with p-value <0.05 were interpreted as being statistically significant. All variables of interest were turned into binary operations of 1 & 0 for further analysis to measure the impact of the intervention. The differences were later subjected to modeling through binary logistic regression analysis to eliminate the impact of the bias from peculiar socio-demographic characteristics of the cluster schools that could affect the outcome of the study considering the non-randomization in the selection of participating schools in the study.

4.7.1 Descriptive statistics

Descriptive statistics of the socio-demographic variables such as marital status, education of mothers and fathers, occupation of mothers and fathers were carried out. Frequency and percentages were calculated and association between them pre and post intervention were measured using Pearson Chi square test. Variables with p-value <0.05 were interpreted as being statistically significant. Average age of respondents and average monthly income of parents were reported as mean with standard deviations.

4.7.2 Logistic regression analysis.

Logistic regression modeling was utilized to study the association between each exposure and outcome variables. The outcome variables were the knowledge scores for causes and symptoms of MDP and the caregiver's attitude and practices on childhood health as indicated earlier on. The results obtained were adjusted for the socio-demographic determinants. Adjustment was made for marital status, education of mother, education of father, occupation of mother and father and number of children raised in the household. Binary logistic regression was used to calculate the odds ratio at 95% confidence interval since the expected outcome variable has been converted to binary operations of 1 (Right/High) or 0 (Wrong/Low). The logistic regression table output provided comprises of two models. Model I provides the crude odds ratio while Model II provides the adjusted odds ratio (adjusted for socio-demographic variables) and corresponding confidence intervals.

5 RESULTS

FINDINGS: DESCRIPTION AND ANALYSIS

This section explores the findings of the case control intervention study. Results are presented in tables (and or chart) with descriptions and analysis of each table with a view to comparing the two study groups of schools pre and post intervention. The demographic characteristics of the groups are compared followed by detailed analysis and testing of responses of caregivers to questions on their knowledge of causes and symptoms of MDP, medication compliance attitude and healthcare service utilization practices. Results of cross tabulations, Pearson chi square tests, binary logistic regression analysis and odds ratio (95% confidence interval) comparing the two groups are hereby presented. Extracts of the validated questionnaire analyzed can be found in appendix 1 showing scoring cues for easier deciphering.

Trend of school sustained injury and other childhood illnesses presented and documented at study designated sick bays over the lifespan of the study were also presented. Test of proportion and trend results for comparison were made specifically for school sustained injury while considering other prevalent cases seen by nurses assigned to the sick bays. The synthesis provided in the discussion section emanated from these findings.

5.1 Characteristics of Intervention and Control school cluster

Table 2 shows that 2,565 pupils were in the intervention cluster while 930 pupils were in the control cluster. Only caregivers of pupils between Nursery 1 and Primary 3 were allowed to participate in the KAP questionnaire at baseline (inclusion criteria). This group of caregivers participated throughout the study. Nine hundred and seventy two pupils in the intervention cluster and 341 pupils in the control cluster were in this group. The proportion of boys and girls were similar among pupils whose caregivers were included in the study;
Two hundred and thirty seven teachers were in the intervention group while 93 teachers were in the control.

Table 2- Table showing the characteristics of intervention and control schools clusters.

Study clusters	IMG (Control)	St.THOMAS cluster (Intervention 1)	OLIVES cluster (Intervention 2)	ABADINA cluster (Intervention 3)	EMMANUEL cluster (Intervention 4)
School pupil Population	930	726	826	538	475
Sample Size (Nursery 1 - Primary 3)	341	370	244	154	204
% Male pupil within sample size	48.4	50.6	51.6	51.9	56.9
% Female pupil within sample size	51.6	49.5	48.4	48.1	43.1
Teachers Population	93	66	56	61	54

5.2 Distribution of Socio-demographic characteristics at baseline and post intervention.

The study was not a follow up study hence all caregivers within the class limit (inclusion criteria) had equal chance of voluntarily participating in the study. Table 3 shows that at baseline, 77%-86% of parents were married while 27%-29% of mothers had low education. 62%-79% of fathers had high education compared to 71%-73% among mothers. Mothers were majorly traders (61-69%) while fathers were mainly Artisans and civil servants (44%-70%). The mean age of respondents was 37.4 years (S.D 10.2).

Statistically significant differences exist between the intervention and control groups with respect to marital status of parents, education of fathers and occupation of fathers. Post-intervention, 77%-85% of parents were married while 31%-48% of mothers had low education compared to 23%-27% of fathers with low education. 76% of mothers in the control group were not traders while 57% were traders in the intervention group. 57%-87% of fathers were civil servants and artisans in both intervention and control groups. The mean age of respondents post intervention was 37.1yrs (S.D 10.9). Statistically significant differences exist between the intervention and control groups in the education/occupation of mothers and occupation of fathers.

TABLE 3: Demography of participants in the study at baseline and post intervention.

TABLE 3: DEMOGRAPHY	Baseline (N=404)			Post Interventionon (N=322)		
Variables	Intervention school n=286 (%)	Control n=118 (%)	P-value	Intervention School n=231 (%)	Control n=91 (%)	P-value
Number of Respondents	286 (70.8)	118 (29.2)		231 (71.7)	91 (28.3)	
Sex of child-Male(m)	147 (51.4)	63 (53.4)	0.716	122 (52.8)	44 (48.4)	0.471
Sex of child-Female(f)	139 (48.4)	55 (46.6)		109 (47.2)	47 (51.6)	
Caregiver Relationship						
Mother	159 (55.6)	89 (75.4)	0.001	107 (54)	57 (63.3)	0.261
Father	59 (20.6)	10 (8.5)		40 (20.2	17 (18.9)	
Other caregivers	68 (23.8)	19 (16.1)		51 (25.8)	16 (17.8)	
Marital status of parents						
1. Married	220 (76.9)	101 (85.6)	0.050	197 (85.3)	70 (76.9)	0.073
2. Not Married	66 (23.1)	17 (14.4)		34 (14.7)	21 (23.1)	
Education of Mother						
1. Low Education	41 (29.3)	21 (26.6)	0.670	71 (30.7)	44 (48.4)	0.003
2. Secondary & Tertiary(Higher) Education	99 (70.7)	58 (73.4)		160 (69.3)	47 (51.6)	
Education of Father						
1. Low Education	38 (38.4)	11 (21.2)	0.032	63 (27.3)	21 (23.1)	0.440
2. Secondary & Tertiary(Higher) Education	61 (61.6)	41 (78.8)		168 (72.7)	70 (76.9)	
Occupation of mother						
1. Traders	198 (69.2)	72 (61.0)	0.111	126 (56.8)	21 (24.4)	<0.001

2. Others	88 (30.8)	46 ((39.0)		96 (43.2)	65(75.6)	
Occupation of father						
1. Traders	160 (55.9)	36 (30.5)	<0.001	91(43.8)	6 (12.8)	<0.001
2. Others	126 (44.1)	82 (69.5)		117 (56.3)	41 (87.2)	
Mean Age of Respondents (year)	38.1 (S.D10.4)	35.6 (S.D 9.8)	0.000	35.3 (S.D 10.6)	37.7 (S.D 11.4)	0.085
Average monthly income of Mothers($USD)	46.5 (S.D 49.3)	37.2 (S.D 32.6)	0.041	122.9 (S.D 75.6)	48.9 (S.D 49.2)	0.001
Average monthly income of Fathers($USD)	58 (S.D 55.2)	68.4 (S.D 60.6)	0.000	105.5(S.D 89.9)	73 (S.D 69.7)	0.007

Others = Unemployed, farmer, civil servant & artisans. Other Caregivers = Grandparents, siblings, teacher, guardian and others. Low education = No Education, primary and qur'anic education. Exchange rate 1USD = 325N

5.3 Knowledge of respondents on causes of malaria, pneumonia and diarrhea

From the scores indicating wrong responses to knowledge questions asked illustrated by table 4, respondents in both groups at baseline had false beliefs about causes of malaria (56%-96%) including sharing of dishes, hot sun, lack of immunization and stress. However, majority (97%-99%) correctly identified mosquito bites as a cause of malaria. Both groups also had poor knowledge on the causes of pneumonia (58%-99%). Exposure to cold flooring or environment is the generally believed cause (94%-98%). 86%-93% of respondents wrongly believed that teeth development in children causes diarrhea. Hot sun/weather (74%) is another wrong cause from both groups. However, 86%-97% rightly indicated poor hygiene and unhygienic food handling as causes of diarrhea.

Post-intervention, knowledge about causes of malaria improved significantly in the intervention group while the control group remained poor across board except in its cause by sharing of dishes (63% to 10%). Causes of malaria by mosquito bite remains unanimous in both groups (98%-100%). Knowledge about causes of pneumonia also improved in the intervention group while it is largely unchanged in the control. False beliefs about causes of diarrhea improved relatively in the intervention group.

Table 4. Table showing percentage of respondents that gave wrong answers to questions on causes of malaria, pneumonia and diarrhea at baseline and post-intervention.

	Baseline			Post intervention		
	Intervention N (%)	Control N (%)	P value	Intervention N (%)	Control N (%)	p value
Malaria;	n=286	n=118		n=231	n=91	
1. Can be contacted by Sharing dishes	140 (51.5)	71 (63.4)	0.033	48 (26.4)	9 (10.1)	0.002
2. Can be contacted by Walking in hot sun	**218 (79.9)**	107 (95.5)	0.000	**87 (43.7)**	82 (92.1)	0.000
3. Can be contacted by Lack of immunization	**215 (79.6)**	110 (98.2)	0.000	**90 (45.9)**	82 (92.1)	0.000
4. Can be contacted by Mosquito bites	**12 (4.3)**	1 (0.9)	0.091	3 (**1.4)**	0	0.258
5. Can be contacted by Stress	**237 (88.8)**	104 (95.4)	0.044	**147 (78.2)**	88 (98.9)	0.000
Pneumonia;						
1. Can be contacted by Not covering food	195 (71.7)	65 (58)	0.009	52 (27.7)	7 (7.9)	0.000
2. Can be contacted by Exposure to the air when a person with the disease coughs or sneezes	257 (92.1)	111 (99.1)	0.008	166 (84.3)	89 (100)	0.000
3. Can be contacted by Lack of immunization	**222 (83.5)**	111 (99.1)	0.000	**86 (46.7)**	89 (100)	0.000
4. Can be contacted by Not washing hands after using the toilet	**203 (76.3)**	107 (95.5)	0.000	**74 (38.5)**	76 (85.4)	0.000
5. Can be contacted by Exposure to cold flooring	18 (6.5)	2 (1.8)	0.059	9 (4.9)	0	0.035
Diarrhea disease;						
1. Can be contacted by Teething	228 (86.4)	105 (92.9)	0.069	142 (75.1)	25 (28.4)	0.000
2. Can be contacted by Using dirty hands to handle food	8 (2.9)	0	0.068	50 (26.5)	63 (71.6)	0.000
3. Can be contacted by Touching items in public places(door knobs, handles in transportation)	39 (14.2)	3 (2.7)	0.001	8 (3.9)	2 (2.2)	0.468
4. Can be contacted by Hot weather	**201 (74.7)**	83 (74.1)	0.900	**7 (5.6)**	0	0.466
5. Can be contacted by They just happen even with clean environment	**164 (61.7)**	57 (50.4)	0.043	**68 (37.4)**	74 (83.1)	0.000

Aggregate knowledge score of respondents on causes of MDP (Table 5) shows that the intervention group has statistically significant increase in knowledge of causes of malaria

(23%-72.5%) while knowledge score remains the same in the control group. Both groups had increase in knowledge of the causes of pneumonia (Intervention-30%-77%, Control-42%-94%). This increased awareness may not be unconnected with the outbreak of Ebola in West Africa during the end line necessitating public health education on its symptoms which mimic diarrhea and pneumonia. Consequently, knowledge on diarrhea increased in both groups (Intervention 48%-97%, Control 64.3%-100%)

Table 5. Table showing the aggregate knowledge score of respondents on causes of malaria, pneumonia and diarrhea classifying them to low/no knowledge and average/excellent knowledge.

	Baseline N(%)		P value	End line N(%)		P value
	Test	Control		Test	Control	
Causes of Malaria knowledge score	n=286	n=118		n=231	n=91	
Low--No knowledge (0-2 score)	202 (77.1)	100 (91.7)	0.001	47 (27.5)	81 (91.0)	<0.001
Average – Excellent knowledge (3-5 score)	60 (22.9)	9 (8.3)		124 (72.5)	8 (9.0)	
Causes of Pneumonia knowledge score						
Low--No knowledge (0-2 score)	184 (69.7)	64 (57.7)	0.026	36 (22.6)	5 (5.7)	0.001
Average – Excellent knowledge (3-5 score)	80 (30.3)	47 (42.3)		123 (77.4)	83 (94.3)	
Causes of Diarrhea knowledge score						
Low--No knowledge (0-2 score)	134 (52.3)	40 (35.7)	0.003	4 (3.4)	0	0.595
Average – Excellent knowledge (3-5 score	122 (47.7)	72 (64.3)		113 (96.6)	8 (100)	

5.4 Knowledge score of respondents on symptoms of malaria, diarrhea and pneumonia.

Table 6 and table 7 show that respondents in both groups have average – excellent knowledge of the symptoms of malaria at baseline and post intervention (Intervention 92%-96%, Control 95%-100%). However, knowledge of the symptoms of pneumonia remains statistically insignificantly low in both groups after the intervention (p=0.124). 80.5% low knowledge in the intervention group increased to 93.2% while the trend is similar in the control (89.7%-97.7%). Respondents in both groups have good knowledge of the symptoms of diarrhea at baseline (92.4%-100%) and post intervention.

TABLE 6: Table showing percentage of respondents that gave wrong answers to questions on symptoms of MDP at baseline and post intervention.

	Baseline			**Post intervention**		
Which of these symptoms identify Malaria?	**Intervention N (%)**	**Control N (%)**	**p value**	**Intervention N (%)**	**Control N (%)**	**p value**
1.Red eyes	237 (86.2)	115 (97.5)	0.010	108 (56.0)	81 (92.0)	0.000
2. Fever	6 (2.2)	1 (0.8)	0.365	4 (1.9)	0	0.193
3. Vomiting	27 (9.6)	9 (7.6)	0.535	15 (7.2)	0	0.009
4. Diarrhea	129 (46.6)	21 (17.8)	0.000	121 (62.1)	1 (1.1)	0.000
5. Body and joint aches	7 (2.5)	3 (2.6)	0.991	14 (6.8)	0	0.012
6. Weight loss	42 (15.3)	0	0.000	19 (9.5)	1 (1.1)	0.100
7. Loss of appetite	18 (6.6)	4 (3.4)	0.216	8 (3.9)	0	0.059
8. Convulsions	190 (69.1)	102 (87.2)	0.000	145 (72.9)	88 (98.9)	0.000
Which of these symptoms identify Pneumonia?						
1.Cough	13 (4.8)	0	0.016	9 (4.3)	0	0.046
2.Vomitting	224 (81.2)	116 (99.1)	0.000	106 (54.4)	87 (98.9)	0.005

3.Weight loss	236 (85.2)	117 (100)	0.000	117 (89.4)	88 (98.9)	0.005
4.Difficulty in breathing	25 (9)	1 (0.9)	0.003	13 (6.2)	0	0.017
5.Difficulty in eating, talking	252 (91.6)	112 (95.7)	0.150	131 (64.9)	88 (98.9)	0.000
6. Blue mouth and tongue	196 (72.9)	101 (86.3)	0.004	132 (68.0)	81 (91.0)	0.000
7. Coma	182 (67.9)	96 (82.1)	0.004	87 (48.6)	87 (97.8	0.000
8. Drowsiness	73 (27.2)	7 (6.0)	0.000	102 (55.7)	0	0.000
9.Headache	229 (85.4)	107 (91.5)	0.104	184 (14.8)	88 (100)	0.030
Which of these symptoms identify Diarrheal Diseases?						
1.Colicky abdominal pain	23 (8.5)	3 (2.6)	0.032	9 (4.6)	1 (1.1)	0.142
2.Ongoing fatigue	38 (13.8)	0	0.000	14 (7.3)	0	0.009
3.Restlessness	247 (88.8)	117 (100)	0.000	175 (87.5)	84 (94.4)	0.077
4. Vomiting	48 (17.3)	4 (3.4)	0.000	107 (55.4)	5 (5.6)	0.000
5.Sunken eyes	12 (4.3)	0	0.023	20 (10.7)	1 (1.1)	0.005
6. Watery stools	15 (5.4)	0	0.011	13 (6.6)	1 (1.1)	0.048

Table 7: Table showing the aggregate knowledge score of respondents on symptoms of malaria, pneumonia and diarrhea classifying them to low/no knowledge and average/excellent knowledge.

	Baseline N (%)		P value	Post Intervention N (%)		P value
	Test n=286	Control n=118		Test n=231	Control n=91	
Symptoms of malaria knowledge score						
Low--No knowledge (0-4 score)	22 (8.3)	6(5.1)	0.273	7 (4.1)	0	0.054
Average – Excellent knowledge (5-8 score)	243(91.7)	111(94.9)		163 (95.9)	88(100.0)	

Symptoms of pneumonia knowledge score						
Low--No knowledge (0-5 score)	202 (80.5)	104 (89.7)	0.028	151 (93.2)	86 (97.7)	0.124
Average – Excellent knowledge (6-9 score)	49 (19.5)	12 (10.3)		11 (6.8)	2 (2.3)	
Symptoms of diarrhea knowledge score						
Low--No knowledge (0-3 score)	20 (7.6)	0	0.002	19 (11.0)	1 (1.1)	0.004
Average – Excellent knowledge (4-6 score	244 (92.4)	116 (100)		1534 (89.0)	88(98.9)	

Table 8. Cross-tabulation of responses to caregivers' medication compliance attitude*.

Question		Intervention Schools (%)	Control Schools (%)	P value
If your child is given a medication by a doctor, when would you stop giving the medication?	Baseline	**62 (22.6)**	53 (44.9)	0.000
	Post intervention	**9 (4.2)**	64 (72.7)	0.000

(*showing percentage of respondents with wrong attitude)

5.5 Caregivers' care-seeking attitude.

Table 8 shows that medication compliance attitude improved significantly in the intervention group (77.4%-95.8%) while the control group has higher tendency to stop medication once symptoms remit (43.2%-70.5%). Table 9 also shows a significant reduction in the percentage of respondents having wrong medication compliance attitude in the intervention group from 23% to 4% while medication compliance attitude declined in the control group post-intervention from 45% to 73%.

Table 9. Aggregate wrong medication compliance attitude score of respondents before and after the intervention.

	Baseline			Post-intervention		
Question-If your child is given a medication by a doctor, when would you stop giving the medication to your child?	N (%) Intervention n= 274	N (%) Control n= 118	P value	N (%) Intervention n= 215	N (%) Control n= 88	P value
When the child completes the recommended dose.	212 (77.4)	65(55.1)	0.000	206 (95.8)	24 (37.3)	0.000
When child gets better.	57 (20.8)	51 (43.2)		9 (4.2)	62 (70.5)	
Anytime I feel like.	5 (1.8)	2 (1.7)		0	2 (2.3)	

5.6 Caregivers care-seeking practices

Result shown in table 10 below shows an increase in the percentage of respondents in the intervention group that makes visiting a primary health centre (PHC) their 1st choice (47.9%-77.9%) with a decrease in the control (22.9%-11.5%). The control group made a shift towards pharmacy visit (11%-65.5%) with a decrease in same practice in the intervention group (30.6%-13.1%).

When scored on preference for health centre utilization (Table 11), statistically significant difference in the practices of caregivers in the two groups post intervention was observed. The control group was consistent in its negative practices (77.1%-88.5%) while a decline was seen in the intervention group from 52.1%-22.1% post intervention.

Table 10. Respondents care seeking practices showing where care is sought first when their child has malaria, diarrhea or pneumonia.

Question: With whom do you seek care first whenever your child has MDP?

	Baseline			Post intervention		
Responses	N (%) Interventio n n= 284	N (%) Control n= 118	P value	N (%) Intervention n= 213	N (%) Control n= 87	P value
I go to the health facility	136 (47.9)	27 (22.9)	0.000	166 (77.9)	10 (11.5)	0.000
I go to the Pharmacy	87 (30.6)	13 (11.0)		28 (13.1)	57 (65.5)	
I go to the traditional healer	2 (0.7)	2 (1.7)		0	2 (2.3)	
I pursue other self-treatment options	10 (3.5)	24 (20.3)		4 (1.9)	1 (1.1)	
I go to a patent medicine vendor	9 (3.2)	30 (25.4)		3 (1.4)		
I go to religious healers	3 (1.1)	0		0		
I go to a nurse who is my neighbor	33 (11.6)	20 (16.9)		12 (5.6)		
Others	4 (1.4)	2 (1.7)		0	0	

Table 11: Aggregate of wrong responses to care seeking practices reflecting the percentage of respondents with wrong practices that enhance childhood morbidity and mortality.

	Baseline			Post-intervention		
Question	Intervention n=284	Control n=118	P value	Intervention n=213	Control n=87	P value
With whom or where do you seek care first?	148 (52.1)	91 (77.1)	0.000	47 (22.1)	77 (88.5)	0.000

5.7 Trend and proportion of cases seen at the sick bays in study clusters.

A review of cases presented at the sick bays (Table 12a) shows a steady decline of wound dressing arising from cuts and lacerations sustained within school premises in the intervention school cluster from 11.7% to 1.4% within the study period. The control group had consistently higher cases of incident wound dressing over the study period (14.6%-8.6%). Table 12b shows a statistically significant difference in the proportion of incident school sustained injury reported in the test schools vis a vis the control group at baseline and post intervention.

Diarrhea, vomiting and stomach ache also decreased over the same period within the intervention group (6.2%-3.6%) while it increased in the control group from 4.3% to 6.7%.

Headache, flu, body pain and fever followed a similar decline in the intervention group with an increase in the control group (21.1%-9.4%).

Figure 4 graphically shows the trend of injury in the study groups with a consistent decline in cases seen at the intervention cluster relatively to the control. A pupil in the control cluster died from a fatal tetanus infection of a wound sustained from a motorcycle accident while in school due to traditional practices of the parents who dressed the wound with animal manure at home when the school was on holiday. It was a death too many. However, no childhood mortality/death was reported in the intervention cluster during the three years of study.

Table 12: Proportion of cases presented at sick bays in participating school clusters from baseline to post intervention.

S/no	Cases	T1 (Sept-Dec 2012)		T2 (Jan-April 2013)		T3 (Sept-Dec 2013)		T4 (May-Aug 2014)	
		C (C%)	T (T%)	C (C%)	T (T%)	C (C%)	T (T%)	C (C%)	T (T%)
1	**Wound dressing**	136 (14.6)	299 (11.7)	93 (10)	109 (4.2)	96 (10.3)	39 (1.5)	80 (8.6)	38 (1.4)
2	Diarrhea, Vomiting, Stomach ache & Others	52 (5.6)	184 (7.2)	45 (4.8)	196 (7.6)	104(11.2)	94(3.6)	80 (8.6)	124(4.8)
3	Headache, Flu, Body pain, Fever	106 (11.4)	542 (21.1)	57 (6.1)	258 (10.1)	152 (16.3)	179 (7.0)	190 (20.4)	241 (9.4)

C= Control school (n=930), T= Intervention School (n=2565) , %= Proportion

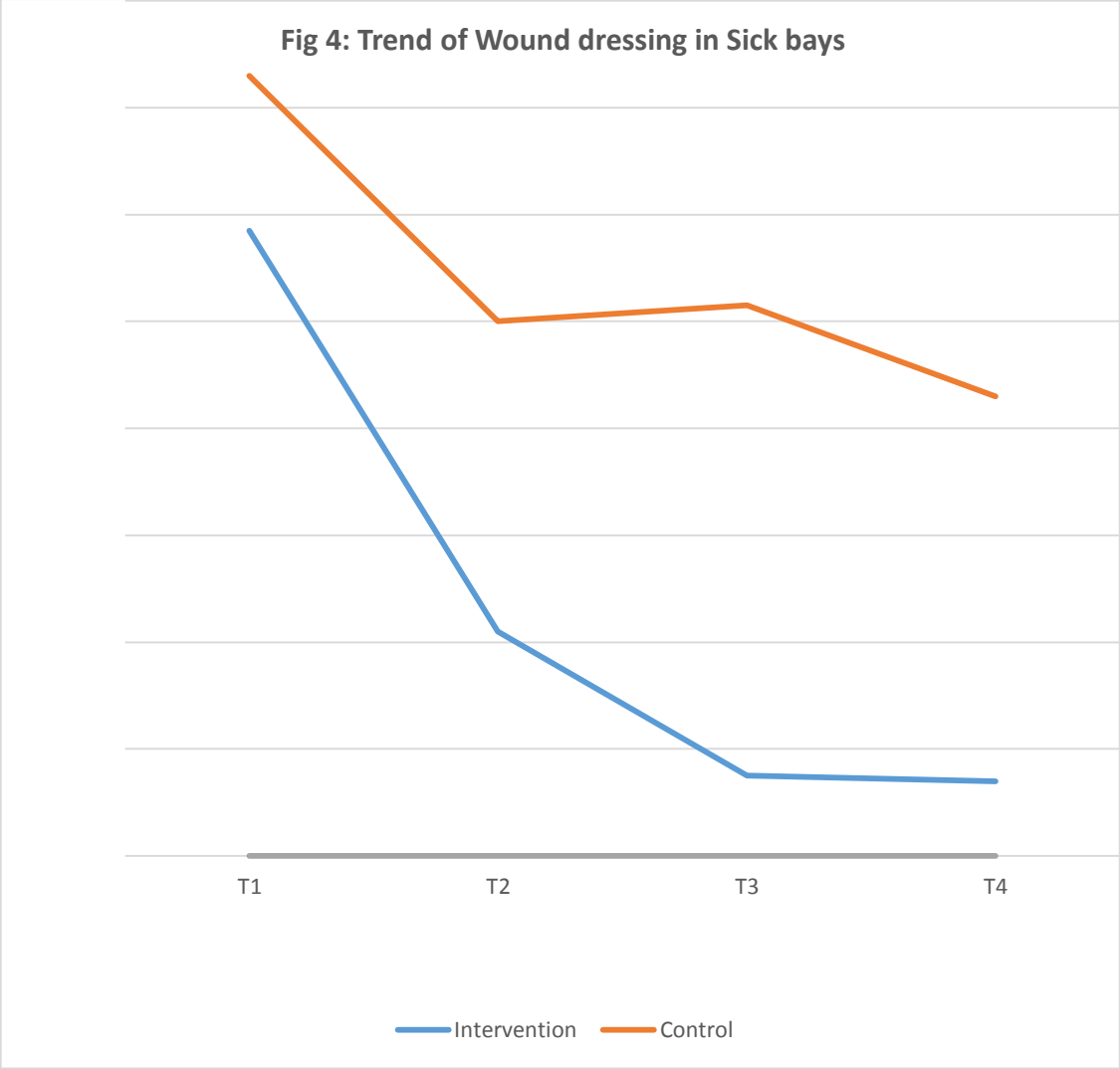
Others= infections, fainting measles, fracture, epixtasis, burns, convulsion, tonsillitis, sprain, visual defect, skin infection and tetanus.

Table 12b: Test of proportions of conditions seen at the sick bays in the study and control groups during the study.

S/no	Cases	T1 (Sept-Dec 2012) Baseline			T4 (May-Aug 2014) Post intervention		
		C% (95% C.I)	T% (95% C.I)	P value	C% (95% C.I)	T% (95% C.I)	P value
1	**Wound dressing**	14.6 (12.3-16.7)	11.7(10.5-12.9)	**0.022**	8.6(6.8-10.4)	1.4(0.95-1.9)	**0.000**
2	Diarrhoea, Vomiting, Stomach ache & Others	5.6 (4.1-7.1)	7.2 (6.2-8.2)	0.096	8.6(6.8-10.4)	4.8(3.9-5.6)	0.000
3	Headache, Flu, Body pain, Fever	11.4 (9.4-13.4)	21.1 (19.5-22.7)	0.000	20.4(17.8-22.9)	9.4(8.3-10.5)	0.000

95% Confidence interval from Stata 14.1 Two sample test of proportions

C=Control school (n=930), T=Intervention School (n=2565), % = Proportion, 95% C.I=95% Confidence Interval, Others= infections, fainting measles, fracture, epixtasis, burns, convulsion, tonsillitis, sprain, visual defect, skin infection and tetanus.



X axis----------T1= Sept-Dec 2012 T2=Jan-April 2013 T3=Sept-Dec 2013 T4= May-Aug 2014

Y axis----------Proportion of school sustained injury recorded per term (C%) 1cm= 2%

5.8 Results of modeling with binary logistic regression analysis before and after intervention to ratify if indeed the differences observed were due to the interventions.

The need to ratify the possible biases that may result from the differences in demographic characteristics of study groups due to non randomization on the outcome of the result necessitated modeling. All variables were coded in binary 0 or 1 (high/low or right/wrong) hence the choice of binary logistic regression. This is necessary to confirm or refute any claims that indeed the intervention was responsible for the differences observed between the

control and intervention group. Modeling was carried out at the beginning (baseline) and post intervention to compare between and across both groups within the different time frames.

Table 13 reveals that at baseline, the intervention group had significantly higher knowledge of causes of malaria with an odds ratio of 3.3 (95% C.I 1.57-6.92). However, this difference became higher with odds ratio 4.31(95% C.I 0.67-27.80) after adjusting for selected demographics albeit statistically insignificant (p value= 0.125). Furthermore, knowledge about causes of pneumonia was much lower in the intervention group at baseline O.R 0.59 (95% C.I 0.37-0.94). Adjustments increased the significant difference between the groups to O.R 0.15 (95% C.I 0.04-0.54). The same trend observed with pneumonia knowledge was observed in their knowledge of causes of diarrhea which was significantly lower in the intervention group. [O.R 0.51(C.I 0.32-0.79) – O.R 0.08(95% C.I 0.03-0.26)]

Table 13: **Odds ratio (O.R) of difference between intervention and control groups regarding caregivers' knowledge score of causes of MDP.**

	High knowledge score (95% C.I) Malaria Crude O.R		High knowledge score (95% C.I) Pneumonia Crude O.R		High knowledge score (95% C.I) Diarrhea Crude O.R	
	Before Intervention	After Intervention	Before Intervention	After Intervention	Before Intervention	After Intervention
Control	1	1	1	1	1	--
Intervention	3.3 (1.57-6.92)	26.713 (12.0-59.46)	0.59 (0.37-0.94)	0.206 (0.08-0.55)	0.51 (0.32-0.79)	--
P value	0.002	0.001	0.025	0.002	0.04	--
		Adjusted Odds ratio (95% C.I)				
	Before Intervention	After Intervention	Before Intervention	After Intervention	Before Intervention	After Intervention
Control	1	1	1	1	1	--
Intervention	4.31(0.67-27.80)	45.659 (12.91-161.57)	0.15 (0.04-0.54)	0.581 (0.17-2.03)	0.08 (0.03-0.26)	--
P value	0.125	0.001	0.004	0.394	0.394	--

95%C.I= 95% Confidence interval. (Adjustment was made for marital status, education of mother, education of father, occupation of mother, occupation of father and number of children.)

Table 13 shows that the intervention group had statistically significant higher knowledge of causes of malaria with odd ratio 26.713 (95% C.I 12.0-59.46) than the control group. The odds ratio became larger after adjusting for demographic variables {45.659 (95% C.I 12.91-161.57)} and remained significant. However, the intervention group had lower knowledge of causes of pneumonia despite the interventions with lower odds 0.206 (95% C.I 0.08-0.55). This did not change significantly after adjusting for demographic variables.[0.581 (95% C.I 0.17-2.03)]. Knowledge about causes of diarrhea is higher in the control although not statistically significant.

Table 14: Odds ratio (O.R) of difference between intervention and control groups regarding caregivers' knowledge score of symptoms of MDP.

	High knowledge score (95% C.I) Malaria Crude O.R		High knowledge score (95% C.I) Pneumonia Crude O.R		High knowledge score (95% C.I) Diarrhea Crude O.R	
	Before Intervention	After Intervention	Before Intervention	After Intervention	Before Intervention	After Intervention
Control	1	1	1	1	--	1
Intervention	0.597 (0.34-1.51)	--	2.102 (1.07-4.13)	3.132 (0.68-14.46)	--	0.092 (0.01-0.70)
P value	0.277	--	0.031	0.143	--	0.021
		Adjusted Odds ratio (95% C.I)				
	Before Intervention	After Intervention	Before Intervention	After Intervention	Before Intervention	After Intervention
Control	1	--	1	1	--	1
Intervention	0.563 (0.2-16.02)	--	1.032 (0.24-4.47)	1.548 (0.26-9.62)	--	0.301 (0.03-2.73)
P value	0.737	--	0.967	0.632	--	0.285

95% C.I= 95% Confidence interval. (Adjustment was made for marital status, education of mother, education of father, occupation of mother, occupation of father and number of children.)

The result of binary logistic regression analysis shown in table 14 shows that at baseline, the intervention group had statistically insignificant lower knowledge of symptoms of malaria with odds ratio 0.597 (95% C.I 0.34-1.51) which remains unchanged after adjusting for demographic variables.[O.R 0.563 (95% C.I 0.2-16.02)]. The intervention group had twice the odds of the control with respect to knowledge of symptoms of Pneumonia O.R 2.102 (95% C.I 1.07-4.13). However, the odds became insignificant (P=0.737) and similar after adjusting for demographic variables [Odds ratio 1.032 (95% C.I 0.24-4.47). There is no statistically significant difference in the knowledge of symptoms of diarrhea in both groups. Both groups had 100% average to excellent knowledge score hence the appearance of zero in the analysis as there were no comparisons.

Table 14 also shows that the control group still had a non-significantly higher knowledge of symptoms of malaria as seen during the baseline after the intervention which is unchanged by adjustments. The intervention group had higher knowledge about symptoms of Pneumonia [3.132 (95% C.I 0.68-14.46)] albeit statistically insignificant. The odds ratio reduced to 1.55 after adjusting for demographic variables and remains insignificant at p value of 0.632. No difference from the baseline was seen in the knowledge of symptoms of diarrhea.

Table 15: Odds ratio (O.R) of differences between intervention and control groups regarding caregivers' health seeking attitude and practice.

	High Attitude score Crude O.R (95% C.I)		High Practice score Crude O.R (95% C.I)	
	Before intervention	After intervention	Before intervention	After intervention
Control	1	1	1	1
Intervention	2.79 (1.76-4.42)	61.037 (26.99-138.01)	3.097 (1.90-5.05)	27.196 (13.05-56.67)
P value	0.001	0.001	0.001	0.001

	Adjusted Odds ratio (95% C.I)			
	Before intervention	After intervention	Before intervention	After intervention
Control	1	1	1	1
Intervention	3.85 (1.58-9.36)	80.056 (26.16-245.02)	3.63 (1.43-9.21)	16.114 (6.55-39.62)
P value	0.003	0.001	0.007	0.001

95%C.I= 95% Confidence interval.

Adjustments made for marital status, education of mother, education of father, occupation of mother, occupation of father and number of children.)

Table 15 shows that at baseline, the intervention group had statistically significant above 3 times more probability of answering correctly or having the right attitude towards medication compliance [O.R 3.85 (95% C.I 1.58-9.36)]and seeking care in the right place O.R 3.63 (95% C.I 1.43-9.21) than the control group even after adjustments were made.

After the intervention, table 15 shows a statistically significant change in attitude and practices of caregivers in the intervention group due to the intervention. Medication compliance attitude increased in the intervention group with odds ratio 61 (95% C.I 26.99-138.01). This odds ratio got increased to 80 (95% C.I 26.16-245.02) after adjusting for demographic variables. Care seeking practices in favor of visiting the health care centre also increased significantly in the intervention group with odds ratio 27.2 (95% C.I 13.05-56.67). Factoring in the difference in the demographics reduced the odds in the intervention group to 16.114 (95% C.I 6.55-39.62) but remained statistically significant.

6. DISCUSSIONS

This section synthesizes the findings with reference to the over-arching aim of the study which is to evaluate the impact of introducing school health education on:

1. Caregivers' knowledge, attitude and practices with regards to malaria, diarrhea and pneumonia (MDP);(while juxtaposing medication compliance attitude with primary health centre utilization practices)
2. School sustained injury by pupils in public primary schools in Ibadan, Oyo state, Nigeria ;(noting trend of morbidities in the study groups)

Extrapolations are made from the results obtained before and after the intervention in both study and control groups. Strength and limitations of the study are reviewed while comparing the findings to earlier studies. Conclusions are drawn based on the facts elucidated dovetailing into the much needed future implications and recommendations that may help in reducing childhood morbidity and mortality in Nigeria and LMIC in general.

6.1 Summary of key findings

The results from the study reflect the situation in the study schools before the study (at baseline) and after the intervention. It is important to summarize the findings at baseline in order to juxtapose with findings after the intervention for clarity.

6.1.1 Findings at baseline.

Caregivers in the study schools had low knowledge of the causes of malaria. The trend is similar with their knowledge on causes of pneumonia. The intervention group had lower knowledge about causes of diarrhea. This shows that the caregivers in the study group have low awareness of the causes of MDP which is important in developing individual preventive health strategies hence, the high morbidity and mortality observed in Nigeria.

On the contrary, respondents have high average- excellent knowledge of the symptoms of malaria and diarrhea but low knowledge about symptoms of Pneumonia. Hence it can be inferred that previous public health campaigns and personal experiences successfully increased awareness of symptoms of malaria and diarrhea but not pneumonia. Knowledge of the causes and the potential self efficacy to prevent them remain low among the respondents

resulting in a reactive but not preventive approach to public health which is counter-productive with number of incident cases on the rise.

Medication compliance attitude of respondents in the control group is worse than in the intervention group with 44.9% of respondents stopping medication either when they feel like or when the child gets better unlike 22.6% who shared the wrong attitude in the intervention group. This leads to frequent relapses and development of drug resistance by causative micro organisms.

Furthermore, majority of respondents in both groups seek care first elsewhere besides the health care facility which is a practice fueling late presentation of cases at the hospital.

Trend of cases in the sick bays reveal an unprecedentedly high percentage of pupils sustaining injury within the school premises. Headache, flu, body pain and fever are also common among pupils in schools in the study.

6.1.2 Findings after the intervention.

Average- excellent knowledge of respondents on causes of malaria in the intervention group increased significantly from 22.9% to 72.5% after the intervention while it remained low in the control group. Knowledge of causes of pneumonia and diarrhea increased in both groups probably due to public campaigns on Ebola during the outbreak in West Africa which coincided with the end of the intervention.

Knowledge of the symptoms of malaria and diarrhea remained high in both groups after the intervention as it was at the baseline. However, knowledge of symptoms of pneumonia remained low in both groups after the intervention.

Positive medication compliance attitude of caregivers in the intervention group increased significantly while it reduced significantly in the control group post intervention. So also, practices of caregivers with respect to seeking care first at the health care facility increased significantly in the intervention group while a reduction was seen in the control.

A steady decline in all childhood morbidity and most importantly, school sustained injury was observed in the intervention group while the trend was comparatively consistent in the control group.

Modeling with binary logistic regression shows that the changes seen in the knowledge of causes of malaria in the intervention group was as a result of the intervention after adjusting for demographic variables that could modify the outcome. Other knowledge variables lost their significance after adjusting for demographic variables. It is worthy of note that both groups had absolute knowledge of symptoms of malaria and diarrhea which gives little room for improvement after the intervention, hence the lack of significant difference seen before and after adjustments were made.

Furthermore, the logistic regression analysis also shows that the positive change in attitude and practices observed in the intervention group was actually due to the intervention.

Succinctly, the analyses show that at baseline, knowledge of causes of malaria is higher in the intervention group while that of pneumonia and diarrhea is greater in the control. Knowledge of symptoms of malaria is higher in the control group. Knowledge of symptoms of pneumonia is the same in both groups after the adjustment while knowledge of diarrhea symptoms is high in both groups. Measured attitude and practices were three times better in the intervention group even after adjustments were made.

The intervention increased knowledge of causes of malaria significantly in the intervention group while it did not have any significant impact on the difference in knowledge of causes of pneumonia or diarrhea in both groups as both groups were comparable. There was no significant change in knowledge of symptoms of MDP in both groups due to the intervention.

However, the intervention had significant positive impact on the attitude and practices of respondents in the intervention group.

Fewer cases of childhood illnesses were also reported over time in the intervention group as a result of the intervention directed towards the caregivers and the pupils. Statistically significant decline in school sustained injury and other illnesses in the intervention group show the importance of instilling self efficacy in pupils to reduce incidence of injury in schools.

6.2 Strength and limitations of the study.

The use of a validated and tested KAP questionnaire in the study gives credit to the veracity of the result. So also, eight training session were carried out with good attendances by

caregivers. However, non randomization in the selection of the participating schools limits comparability of the study schools. Furthermore, a longitudinal research study design would have been more credible. Such a follow up study would have been more informative as the probability of all parents attending all seminars is low hence the measurements may not be accurate as they were from group data, not desirable individual follow-up data.

In retrospect, the deployment of nurses as interviewers resulted in biases which could have been eliminated by hiring neutral enumerators. Moreover, the presence of a nurse and sick bay in the control group could lead to bias as nurses would naturally intervene in health matters thereby creating unwanted awareness or education which may have reflected in increased knowledge in the control group. A mini intervention was done in the control group after the intervention for ethical reasons as caregivers complained about being left out of the intervention as seen in the intervention group. This could have affected the evaluation negatively. Recall bias from respondents could also have some negative impact as preventive health education training program and post intervention evaluation were far apart.

6.3 Comparison with earlier studies and public health implication of the study findings.

This study corroborates the conclusion of the study by Oguonu T., Okafor H.U, Obu H.A, (2004) on KAP of parents on Malaria in Enugu thirteen years earlier and goes further to show that attitudes and practices can be changed significantly by carrying out health education in PTA meetings in Nigeria in a community based approach. A decline in cases of childhood illness on the intervention group over time seems to be due to the intervention.

(C. Jones et al., 2014; Zhang et al., 2013) study on malaria prevalence, risk factors and KAP assessment among rural Hausa communities in Kano state, Nigeria reported that 95% of respondents had good knowledge of malaria transmission, symptoms and prevention but utilization rate of ITN was 49.5% despite its availability for free by the government, showing a gap between actual knowledge and practical practices that prevent the disease. It was concluded that significant gap exist in practices despite high level of knowledge warning that community mobilization and health education regarding the use of ITN to prevent malaria to save lives in endemic areas is necessary. This study failed to give recommendations to how this can be successfully carried out. This intervention study shows that a program directed at

changing practices would be effective and could be the much needed solution to reducing morbidity and mortality from MDP. Similar outcome can be obtained with respect to diarrhea and pneumonia.

This study also confirms that community based approach recommended by Bedford KJA would be effective indeed. It extends the application of health belief model into a community based model which the study suggests would actively engage caregivers in the same community in a didactic and contributory manner. Participation of school teachers as health educators, involvement of community leaders and gatekeepers in the health education sessions, pupils in play lets and providing referral linkages to nearest primary health centre created a model for policy makers to emulate tagged IPCIP Model (Appendix 3) which could improve health care utilization and monitoring in developing countries.
This study reaffirms the conclusion that if caregivers are educated on the merits of utilizing PHCs, attitudes and practices will change as seen in the intervention group with an increase in preference for PHC utilization while self-medication increased in the control group.

The study recorded a high number of school sustained injuries in both groups. The result shows significant decline in the proportion of injuries seen in the intervention group. This implies that ceteris paribus, a change in socio-psychological reasoning of pupils will reduce school sustained injury in elementary schools by applying HBM self-efficacy approach. This gives a novel psycho-social approach to reducing injuries in schools unlike other studies reviewed in the literature. This study further reaffirms that by encouraging self-efficacy as opined by HBM, pupils can effectively change their attitude towards injury risks. This study corroborates and confirms that the application of the result of the study by Zhang L-L, Dalal K, Wang S-M (2013) which could help in reducing injuries in schools although the researchers were only interested in the risk and self-efficacy factors in pupils. Converting their findings into an actual intervention is a desirable merit of this study.

Lastly, the poor change in knowledge post intervention corroborates Jones C.J et. al's (2013) view that it may be behavioral change techniques rather than theoretical application of the HBM that is related to intervention successes. Hence there is more need to study on how behavior of caregivers can be altered without putting emphasis on knowledge change which has been the focus of past interventions. This will enable public health consultants to design

appropriate IECs for effective change in attitude and practices which is much needed for a decline in morbidity and mortality to be feasible. This new study and intervention direction may unlock the futility in past interventions. Utilizing the didactic PTA school health model would also have a wider reach necessary for community behavioral change.

6.4 Conclusion, future implication and recommendations

The result of the study reveals that caregivers' attitude on medication compliance and health seeking practices can be improved by the introduction of preventive health education to PTA meetings. These would increase health care service utilization, reduce self-medication and reduce drug resistance thereby reducing childhood morbidity and mortality. Changes in the knowledge of causes and symptoms of MDP varied and were not significant except in malaria. It appears that it is more difficult to change the knowledge of caregivers but attitude and practices can be changed easily hence the need for future interventionists to design IECs and program content that will be aimed at changing attitudes and practices other than knowledge. The result also indicates that pneumonia should be emphasized as a public health emergency due to relatively low awareness and paucity of studies on it relatively to malaria and diarrhea. Pneumonia would become the leading cause of death in children in low and middle income countries (LMIC) if counter measures are not taken any time soon.

Furthermore, counseling of pupils drastically reduced the incidence of injury in the intervention group. Training of teachers on preventive health, first aid administration and availability of first aid kits in schools in LMIC are expedient considering the alarming proportion of pupils that sustained injuries in the study schools. Teachers can play a pivotal role in the community based approach depicted by the IPCIP model (Appendix 3) for a complete turnaround in the fate of caregivers in Nigeria. Teachers' role in education and health need to be redefined. They should be empowered with appropriate training and motivation to fulfill this important mandate. The school health policy in Nigeria needs to be reviewed to accommodate the gaps highlighted by this study including actual monitored provision of first aid kits and introduction of preventive health education to PTA meetings.

The study also suggests that introduction of preventive health education to PTA meetings in public primary schools will help in reducing childhood morbidity and mortality in Nigeria

over time.

Lastly, a randomized longitudinal effectiveness study should be carried out to confirm or refute the efficiency and effectiveness of the pilot PTA school health model with appropriate academic research design. This novel approach to public health information dissemination would have a huge impact on hitherto unreached sects of the developing world as free public schools form a rallying point for such caregivers. Such vantage should be maximized or at least optimized for effective and efficient preventive health information dissemination in Nigeria, sub-Saharan Africa and by extension, other LMIC.

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8 APPENDICES

Appendix 1: Scoring sheet for analyses. (Correct answers are marked X while the other two options were combined)

How can a child get any of these ailments (diseases)?

Malaria	**1. Yes**	**2. No**	**3. Don't know**	
1. Sharing dishes		X		
2.Walking in hot sun		X		
3. Lack of immunization		X		
4. Mosquito bites	X			
5. Stress		X		
Pneumonia				
1.Not covering food		X		
2. Exposure to the air when a person with the disease coughs or sneezes	X			
3.Lack of immunizations	X			

4.Not washing hands after using the toilet		X		
5. Exposure to cold flooring	X			
Diarrheal diseases				
1.Teething,		X		
2. Using dirty hands to handle food	X			
3.Touching items in public places(door knobs, handles in transportation)	X			
4. Hot weather		X		
5.They just happen even with clean environment		X		

The following are symptoms of diseases in children. Mention symptoms that readily identify Malaria, Pneumonia or diarrhea.

77. Malaria	**1. Yes**	**2. No**	**3. Don't know**
1.Red eyes		X	
2. Fever	X		
3. Vomiting	X		
4. Diarrhea	X		
5. Body and joint aches	X		
6. Weight loss	X		
7. Loss of appetite	X		
8. Convulsions		X	
78. Pneumonia			
1.Cough	X		
2.Vomitting	X		
3.Weight loss		X	
4.Difficulty in breathing	X		
5.Difficulty in eating, talking		X	

6. Blue mouth and tongue		X	
7. Coma		X	
8. Drowsiness	X		
9.Headache		X	
79. Diarrheal Diseases			
1.Colicky abdominal pain	X		
2.Ongoing fatigue	X		
3.Restlessness		X	
4. Vomiting	X		
5.Sunken eyes	X		
6. Watery stools	X		

Questions on Attitude and Practices of parents.

1. If your child is given medication, when would you stop giving the medication (Please tick one)

1. When child completes the recommended dose

X

2 .When child gets better

3. Anytime I feel like

2. With whom or where would you seek care first if your child has malaria, diarrhea or pneumonia

1. Go to health facility

x

2. Go to pharmacy

3. Go to traditional healer

4. Pursue other self-treatment options (herbs, etc.)

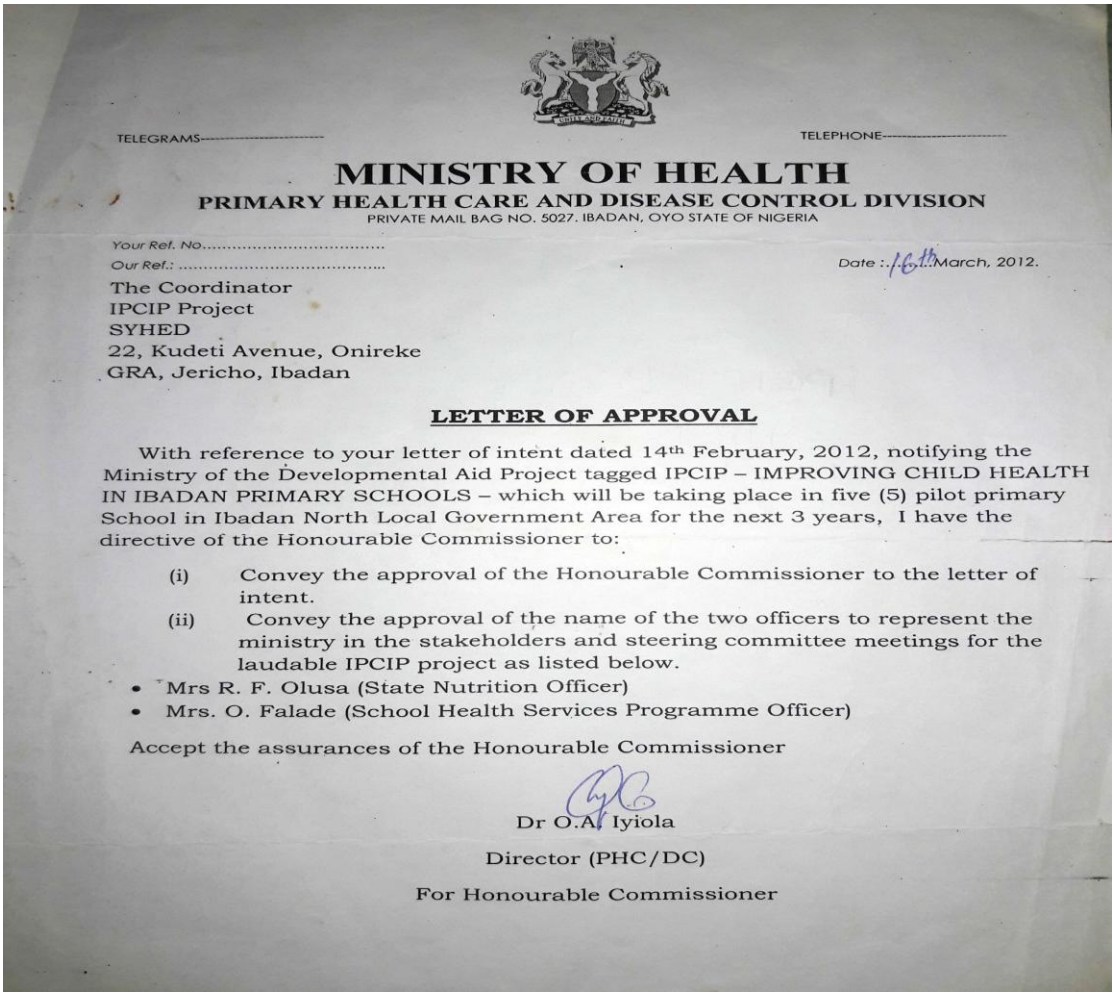
5. Propriety patent medicine vendors, chemist

6. Religious healers

7. Nurse who is your neighbor

8. Others

Appendix 2. Approvals for the study



TELEGRAMS---------- TELEPHONE----------

MINISTRY OF HEALTH

PRIMARY HEALTH CARE AND DISEASE CONTROL DIVISION

PRIVATE MAIL BAG NO. 5027. IBADAN, OYO STATE OF NIGERIA

Your Ref. No.....

Our Ref.: .....

Date :16th March, 2012.

The Coordinator
IPCIP Project
SYHED
22, Kudeti Avenue, Onireke
GRA, Jericho, Ibadan

LETTER OF APPROVAL

With reference to your letter of intent dated 14th February, 2012, notifying the Ministry of the Developmental Aid Project tagged IPCIP – IMPROVING CHILD HEALTH IN IBADAN PRIMARY SCHOOLS – which will be taking place in five (5) pilot primary School in Ibadan North Local Government Area for the next 3 years, I have the directive of the Honourable Commissioner to:

(i) Convey the approval of the Honourable Commissioner to the letter of intent.

(ii) Convey the approval of the name of the two officers to represent the ministry in the stakeholders and steering committee meetings for the laudable IPCIP project as listed below.

- Mrs R. F. Olusa (State Nutrition Officer)
- Mrs. O. Falade (School Health Services Programme Officer)

Accept the assurances of the Honourable Commissioner

Dr O.A. Iyiola

Director (PHC/DC)

For Honourable Commissioner

TELEPHONE: IBADAN

PRIVATE MAIL BAG NO 5014
MINISTRY OF *EDUCATION*

..... DEPARTMENT
IBADAN, OYO STATE OF NIGERIA

Your Ref. No
All correspondence should be addressed to the Hon Commissioner
Quoting
Our Ref. No FLHE/10/4/T6/15

Date 8TH May, 2012. *20*

Pharm Kolawole Jegede
IPCIP Project Coordinator,
SYHED
22, Kudeti Avenue, Onireke.

RE-REQUEST FOR PROJECT APPROVAL

I am directed to refer to your letter dated 6th March, 2012 on the above subject and to inform you that the Honourable Commissioner for Education has graciously granted approval to your NGO to carry out your project in 13 public Primary Schools located within Ibadan North Local Government Area.

2. Thank you.

L T Oladeji
L.T. Oladeji (Mrs),

For: Hon. Commissioner for Education

OYO STATE
UNIVERSAL BASIC EDUCATION BOARD
(OYO-SUBEB)
P.M.B. 5150, Secretariat, Agodi, Ibadan
Phone: 02-7524175, 02-7523437
e-mail:chairman@oyosubebnigeria.net/oyosubebchairman@yahoo.com www.oyosubebnigeria.net

.....SM & ICT.....Department

Our Ref: SUBEB/G.1249/ *Your Ref:* *Date:* 15th May, 2012

The Project Coordinator,
Sapphire Youth Health & Educational,
Development Initiative,
13 Oluyoro Street Awolowo Avenue,
Bodija, Ibadan.

Sir,

RE: INVITATION TO STEERING COMMITTEE

I am directed to refer to the above subject and to convey the Board's approval to commence the execution of your Health Programme in the following underlisted schools in Ibadan North Local Government.

i. Abadina School 1,2 and 3, University of Ibadan
ii. Immanuel College Primary School and 2 U.I.
iii. St. Thomas Primary School 1,2, and 3 Agbowo, Ibadan
iv. Olives Primary Schools 1 and 2, Iso Pako, Bodija, Ibadan
v. I.M.G. School1 and 2, CAC Schools 1 and 2, Yemetu, Ibadan and

to forward the nomination of the representative of the Board to serve in the Steering Committee.

2. Please find below the name of the nominee.

Mr. L. A. Kareem
SM & ICT Department
Telephone NO. 08055607785

3. I thank you.

L B Eniola
L. B. Eniola, (Mrs),
D(SM &ICT)

All correspondence should be addressed to the Chairman, Oyo State Universal Basic Education Board

Appendix 3: IPCIP PROPOSED MODEL